

ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 115 1/4  
ZEXEL No. : 101402-2033  
Date : 25.06.1990 [4]  
Company : HINO  
Engine : W04C-T / 22020 2732A

IP-Type number : 101040-9300 / PES4A  
Governor type number : 105400-5721 / EP/RSV

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.2 ± 0.03  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1 - 3 - 4 - 2

Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-90-180-270

Tolerance +- °C: 0.50 (0.75)

**A1**

ZEXEL - Test values

Injection pumps



Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.6	1500	94.0 - 98.0	± 3	Rack	Basic
H	approx. 7.1	400	10.6 - 13.6	± 15	Rack	Basic
A	10.6	1500	94.0 - 98.0	-	Lever	Basic

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

**A2**

ZEXEL - Test values

Injection pumps



**A3**

ZEXEL - Test values

Injection pumps



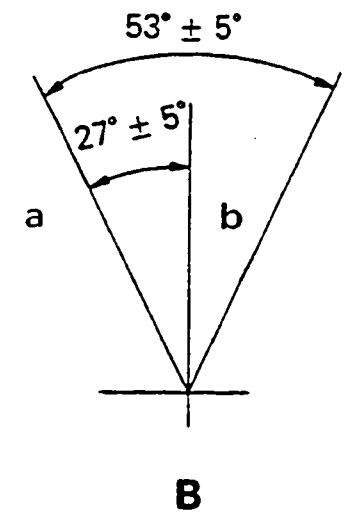
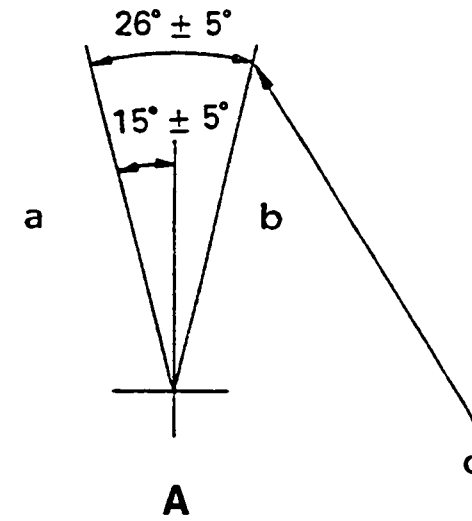
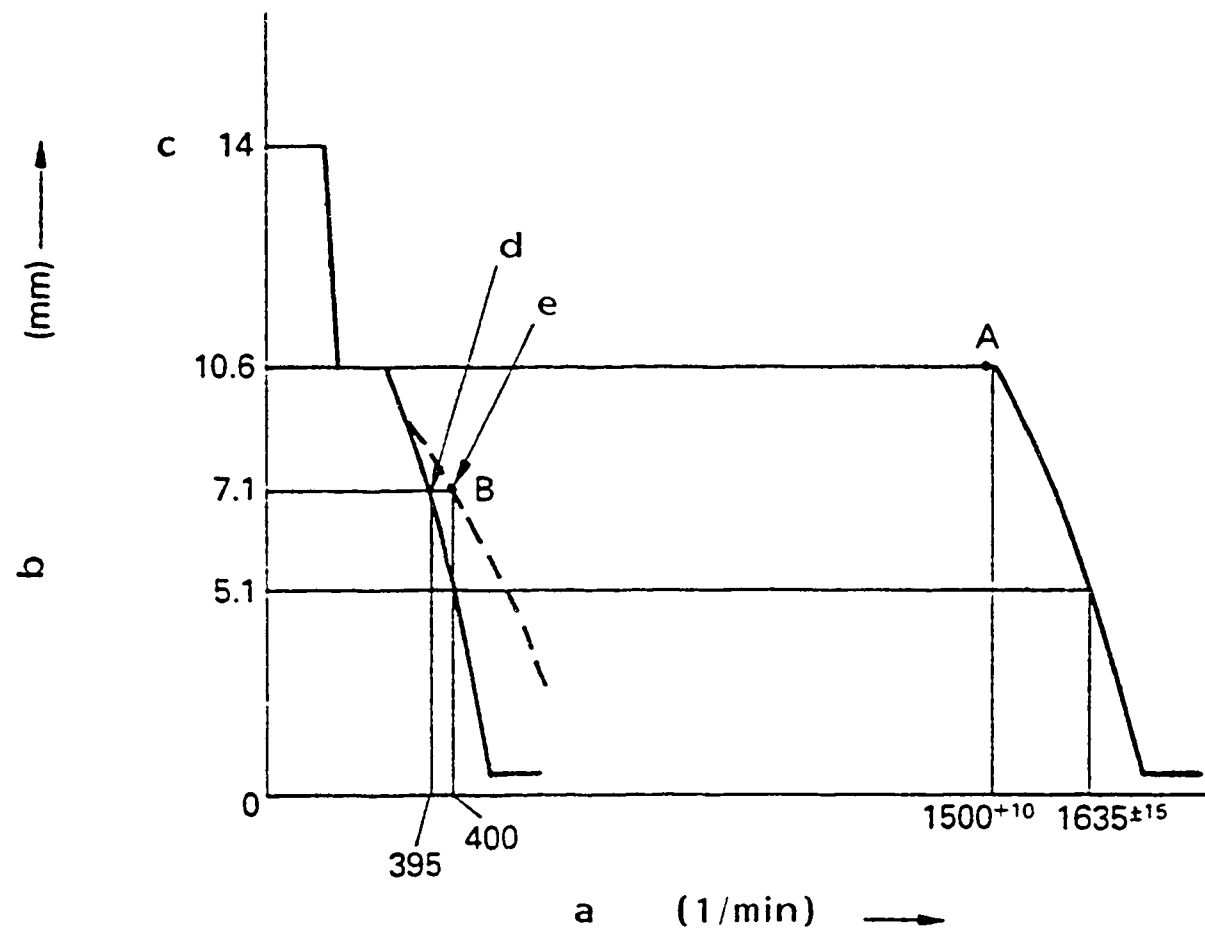


Fig. 1

GOVERNOR ADJUSTMENT

Recommended speed droop adjustment screw position: (12)  
(Notches from fully tightened position)

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a = Pump speed  
b = Control rack position  
c = above  
d = Main spring set  
e = Idle-sub spring set

A = Speed control lever angle  
a = Full-speed  
b = Idling  
c = Stopper bolt set

B = Stop lever angle  
a = Normal  
b = Stop

■ Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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ZEXEL - Test values  
Injection pumps



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Injection pumps



	Pump Speed (rpm)	Rack Position (mm)	Remarks
Full-speed Adjustment (Temporary)	1500 + 10	10.6	• Adjust using screw (1)
Full-load Adjustment	1500	10.6	• Adjust using screw (5)
Maximum-speed Adjustment	1500 + 10	10.6	• Adjust using screw (1)
	1635 ± 15	5.1	• Adjust speed droop using screw (2)
Idling Adjustment	395	7.1	• Fix control lever
	400	7.1	• Adjust using idling-sub spring capsule (4)
	-	-	• Confirm
Control Lever Angle Measurement	<ul style="list-style-type: none"> <li>• Measure the control lever angle at the "idling" and "full" positions.</li> <li>• When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one.</li> <li>• When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.</li> </ul>		

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ZEXEL - Test values  
Injection pumps



**A7**

ZEXEL - Test values  
Injection pumps



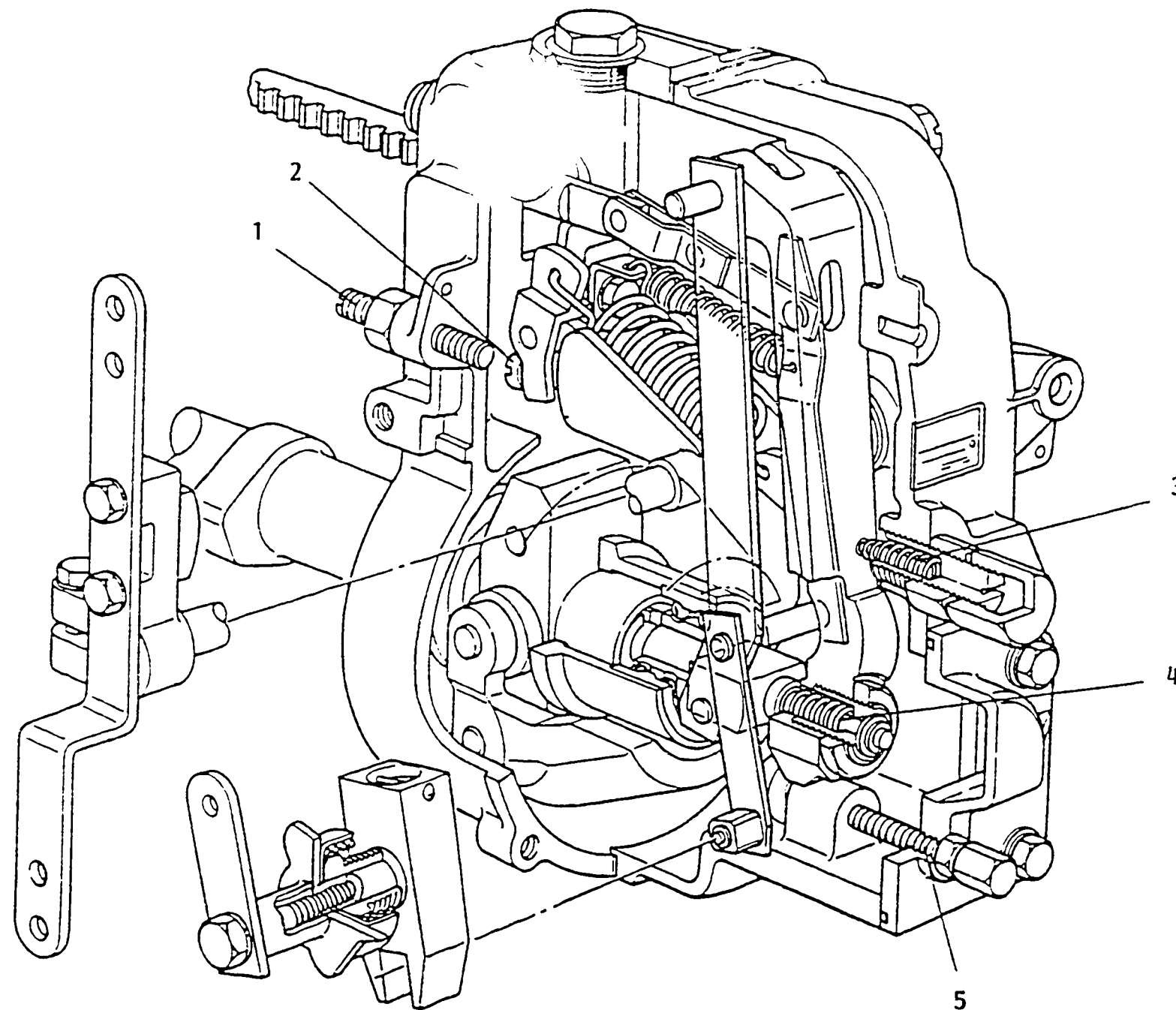


Fig. 2

- 1 = Screw
- 2 = Screw
- 3 = Spring capsule
- 4 = Spring capsule
- 5 = Screw

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Injection pumps



**A9**

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Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 104 1/4  
ZEXEL No. : 101491-3160  
Date : 25.06.1990 [1]  
Company : KOMATSU  
Engine : 4D105 / 6130711305

IP-Type number : 101049-8070 / PES4A  
Governor type number : 105402-1260 / EP/RSV

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.0 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1 - 2 - 4 - 3

Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-90-180-270

Tolerance +- °C: 0.50 (0.75)



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.8	675	62.7 - 65.3	± 2	Lever	Basic
B	(9.2)	975	53.0 - 56.4	± 3	Lever	
C	9.0	1000	50.7 - 53.9	± 3	Lever	
D	approx. 8.5	350	13.7 - 17.3	± 10	Rack	

Timing Advance Specification : EP/SBZ  
105629-0080

Speed (rpm)	450-650	675	800	1000			
Advance Angle (deg)	START	0.5-1.5	1.4-2.9	Finish 3.5-4.5			

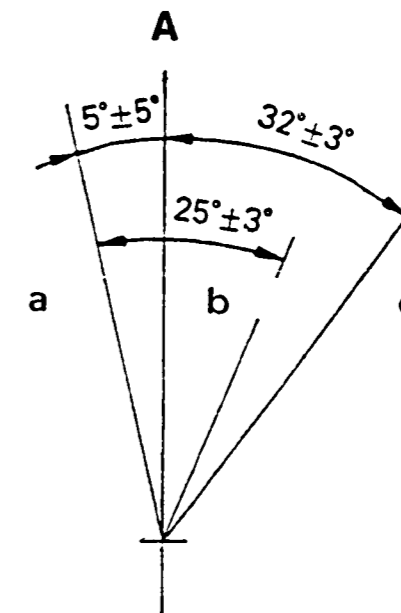
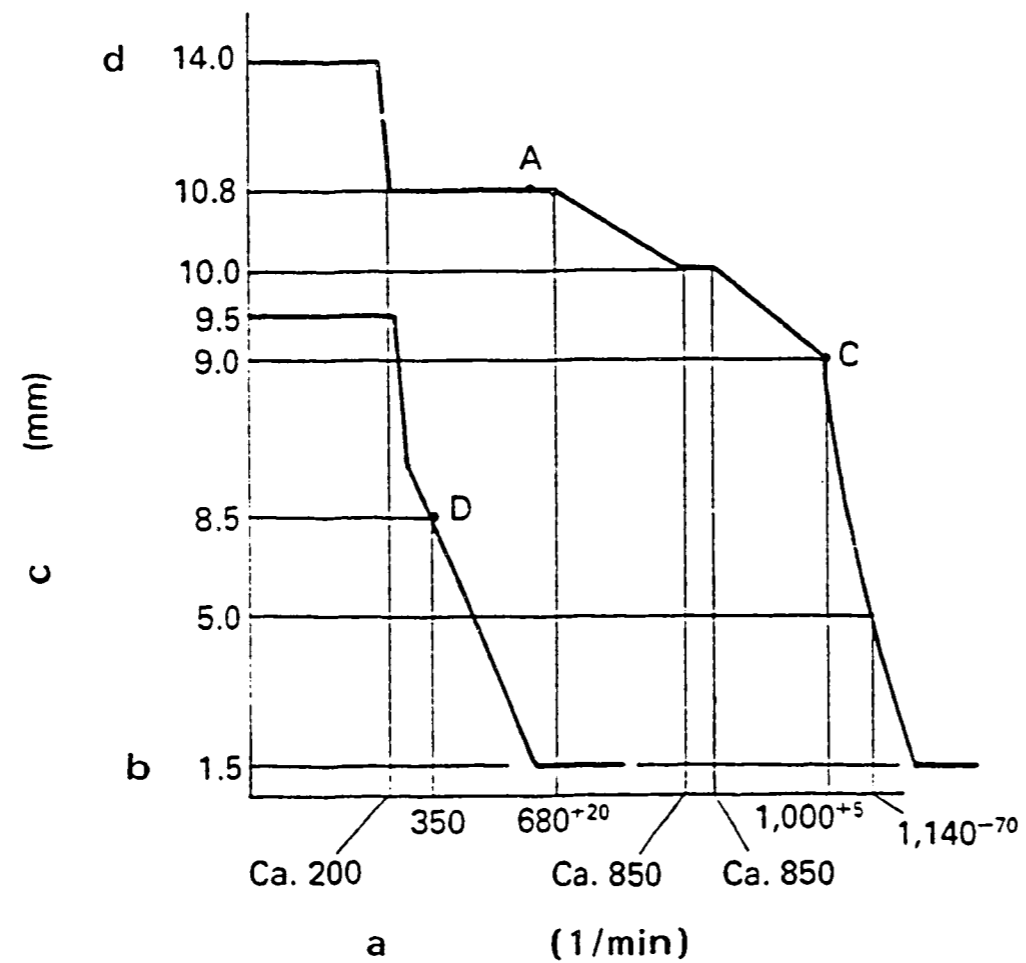


Fig. 3 GOVERNOR ADJUSTMENT

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a = Pump speed  
 b = below  
 c = Control rack position  
 d = above

A = Stop lever angle  
 a = Full-speed  
 b = Idling  
 c = Stop

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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 Injection pumps



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ZEXEL - Test values  
 Injection pumps





## ■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	995 - 1005	10.0	• Adjust using screw (1)
	1000	10.0	• Adjust using screw (4)
Torque Control spring Adjustment	675	10.8	• Adjust using spring cap.(2)
	680 - 700	10.8	• Confirm
	approx. 850	10.0	• Confirm • Confirm the torque stroke is 0.8 mm
Idling Adjustment	0	9.5	• Fix the control lever
	350	8.5	• Adjust using spring cap.(3)
	-	approx. 6.2	• Confirm
	-	-	
Maximum-speed Adjustment	995 - 1005	9.0	• Adjust using screw (1)
	1070 - 1140	5.0	• Confirm speed droop
	approx. 1200	below 1.5	• Confirm • Confirm
Torque Spring Adjustment	975	(9.2)	• Adjust using spring capsule (5)
	approx. 850	10.0	• Confirm
	995 - 1005	9.0	• Confirm
Full-load Adjustment (Install the cover on governor cover)	675	10.8	• Adjust using screw (4)
Control Lever Angle Measurement	<ul style="list-style-type: none"> <li>• Measure the control lever angle at the "idling" and "full" positions.</li> <li>• When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one.</li> <li>• When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.</li> </ul>		

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Injection pumps

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ZEXEL - Test values  
Injection pumps

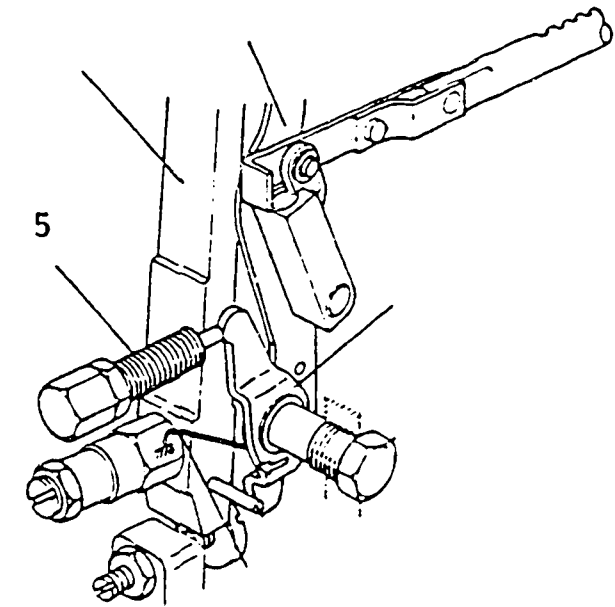
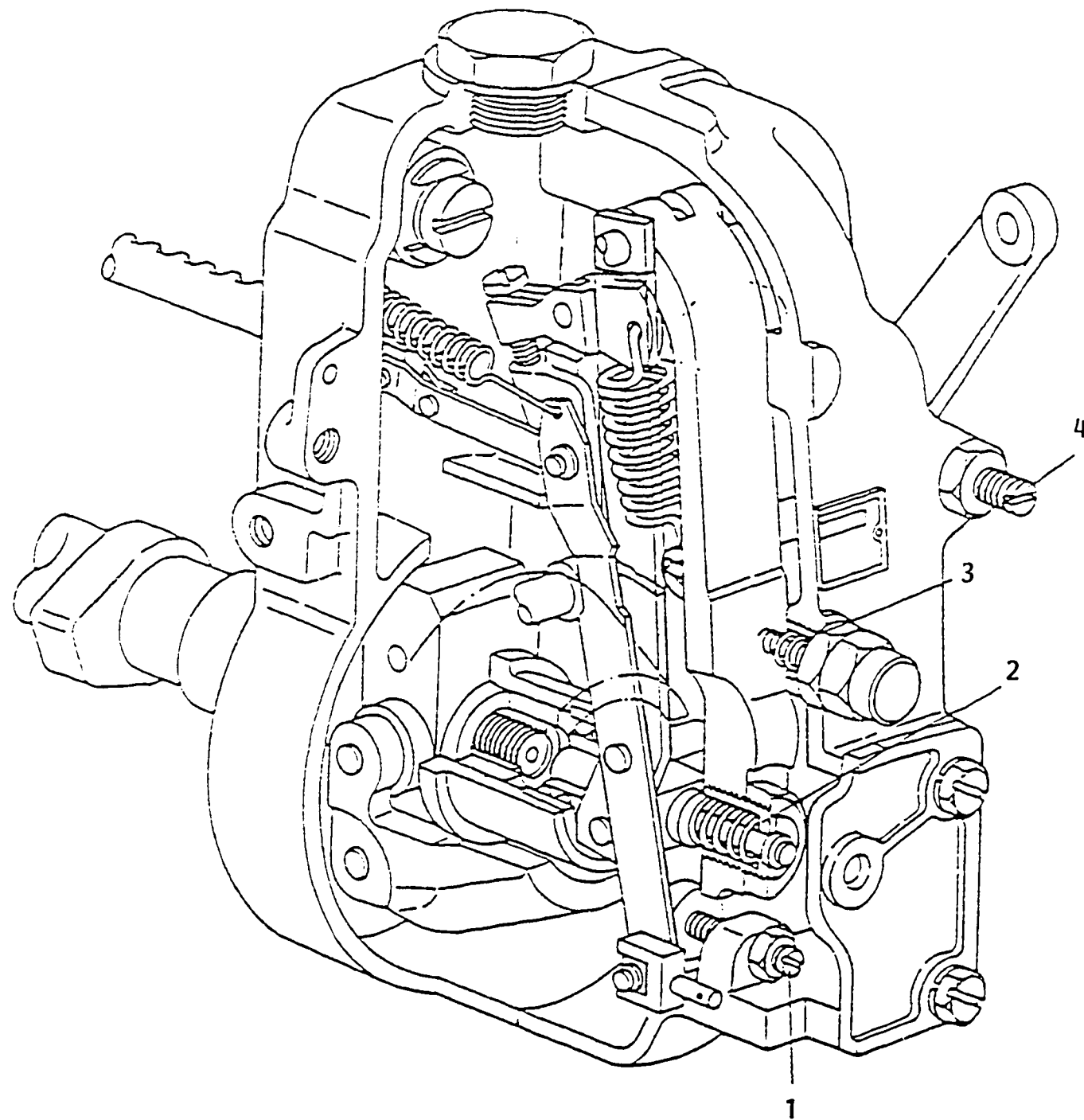


Fig. 4

- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Screw
- 5 = Torque spring capsule

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**A17**

ZEXEL - Test values  
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**A18**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

<u>BOSCH No.</u>	: 9 400 610 105	1/4
<u>ZEXEL No.</u>	: 101492-0331	
<u>Date</u>	: 25.06.1990	[1]
<u>Company</u>	: ISUZU	
<u>Engine</u>	: 4JA1 / 894430-2532	

IP-Type number : 101049-9620 / PES4A  
Governor type number : 105400-4210 / EP/RSV

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : -  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.3 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1 - 3 - 4 - 2

Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-90-180-270

Tolerance +- °C: 0.50 (0.75)



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.4	1250	40.4 - 42.4	± 2.5	Lever	Basic
B	approx. 8.8	450	9.4 - 13.4	± 15	Rack	

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

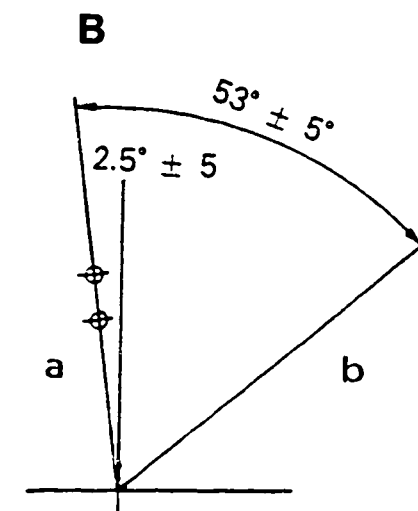
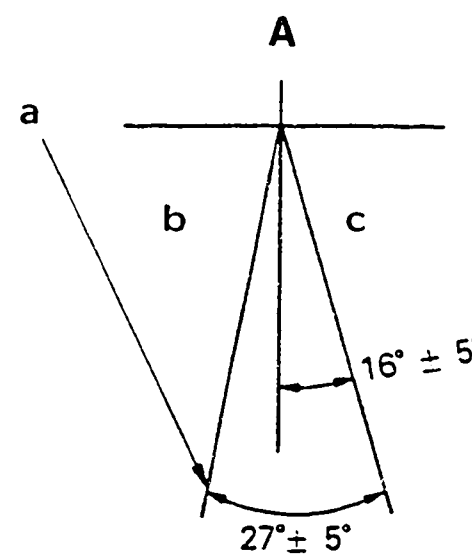
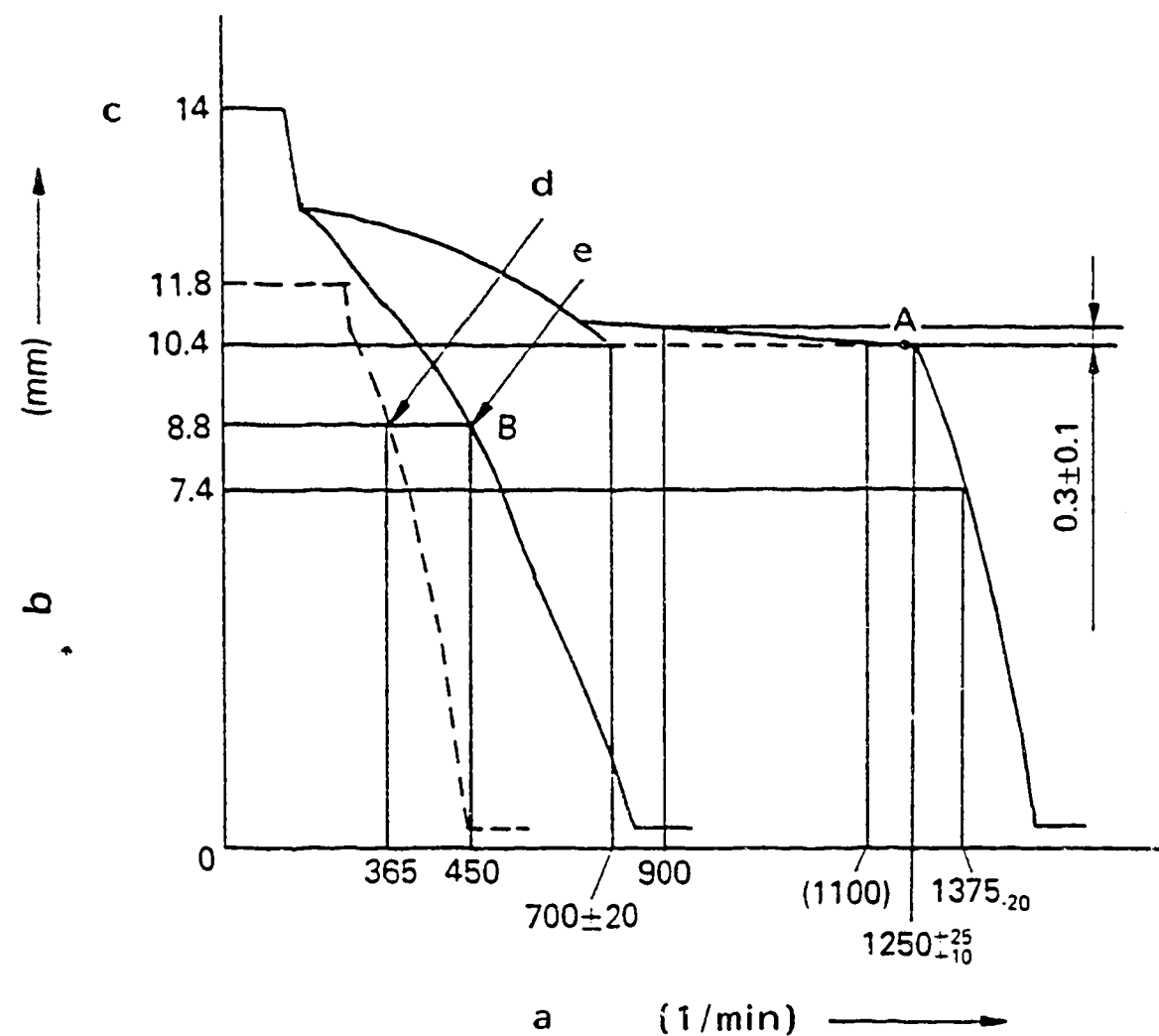


Fig. 5

GOVERNOR ADJUSTMENT

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- a = Pump speed
- b = Control rack position
- c = above
- d = Idle sub spring set
- e = Main spring set

A = Speed control lever angle

B = Stop lever angle

- a = Stopper bolt set
- b = Idling
- c = Full-speed

- a = Normal
- b = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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ZEXEL - Test values  
Injection pumps



## ■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1260 - 1275	10.4	• Adjust using control lever
	1250	10.4	• Adjust using screw (1)
Torque Control spring Adjustment	500	12.1	• Adjust using spring cap.(3)
	680 - 720	10.4	• Confirm
	900	10.6 - 10.8	• Adjust using spring cap.(2)
	(1100)	10.4	• Confirm the torque stroke
Maximum-speed Adjustment	1260 - 1275	10.4	• Adjust using screw (5)
Idle sub Adjustment	365	8.8	• Adjust using spring cap (2)
	0	11.8	• Fix the control lever
	450	8.8	• Adjust using control lever
	-	-	• Confirm
Confirm High-Idling speed (Install the cover on governor cover)	1250	10.4	• Adjust using screw (6)
	1355 - 1375	7.4	• Adjust using control lever
Control Lever Angle Measurement	<ul style="list-style-type: none"> <li>• Measure the control lever angle at the "idling" and "full" positions.</li> <li>• When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one.</li> <li>• When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.</li> </ul>		

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Injection pumps

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ZEXEL - Test values  
Injection pumps

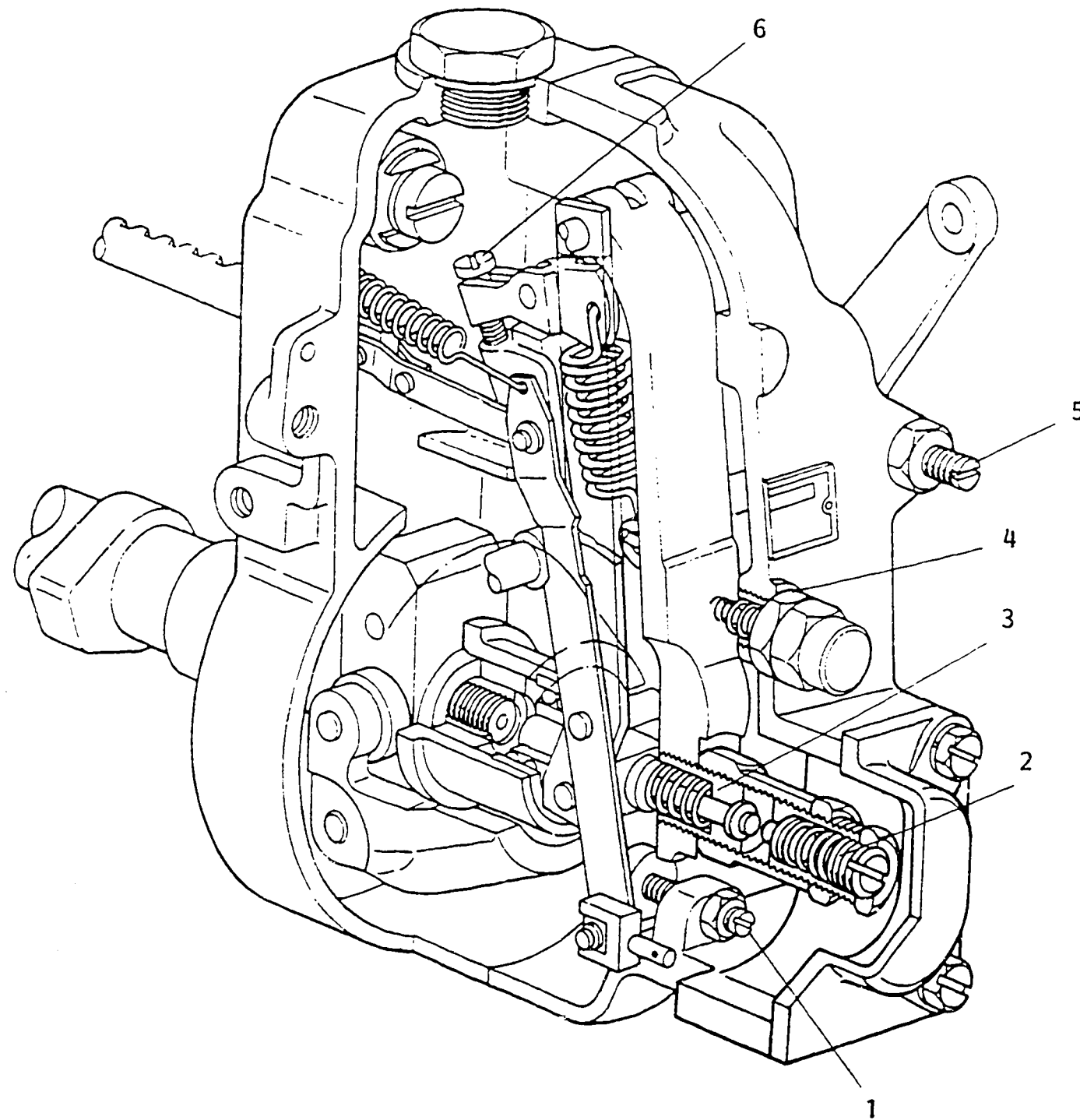


Fig. 6

- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Spring capsule
- 5 = Screw
- 6 = Screw

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ZEXEL - Test values  
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**A27**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

<u>BOSCH No.</u>	:	<u>9 400 610 107</u>	<u>1/5</u>
<u>ZEXEL No.</u>	:	<u>101602-0931</u>	
<u>Date</u>	:	<u>25.06.1990</u>	<u>[1]</u>
<u>Company</u>	:	<u>ISUZU</u>	
<u>Engine</u>	:	<u>6BD1-T / 115601-2243</u>	

IP-Type number	:	101060-8660 / PES6A
Governor type number	:	105410-6520 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	3.4 ± 0.05
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-60-120-180-240-300
Tolerance	+ - °C :	0.50 (0.75)

**B1**

ZEXEL - Test values

Injection pumps





Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	8.5	800	71.5 - 74.5	± 2.5	Lever	Basic
B	approx. 5.4	400	8.1 - 10.7	± 14	Rack	
				-		

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

**B2**

ZEXEL - Test values  
Injection pumps



**B3**

ZEXEL - Test values  
Injection pumps



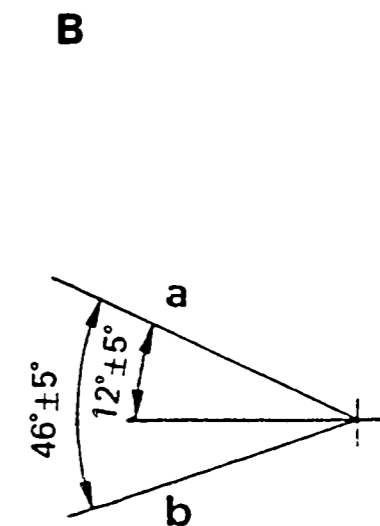
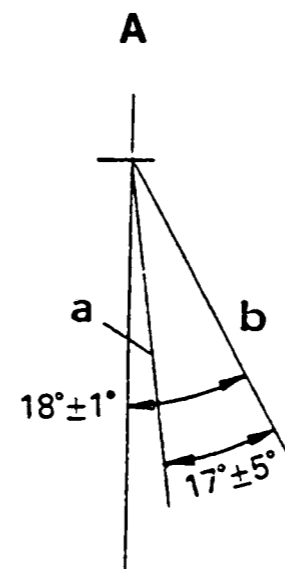
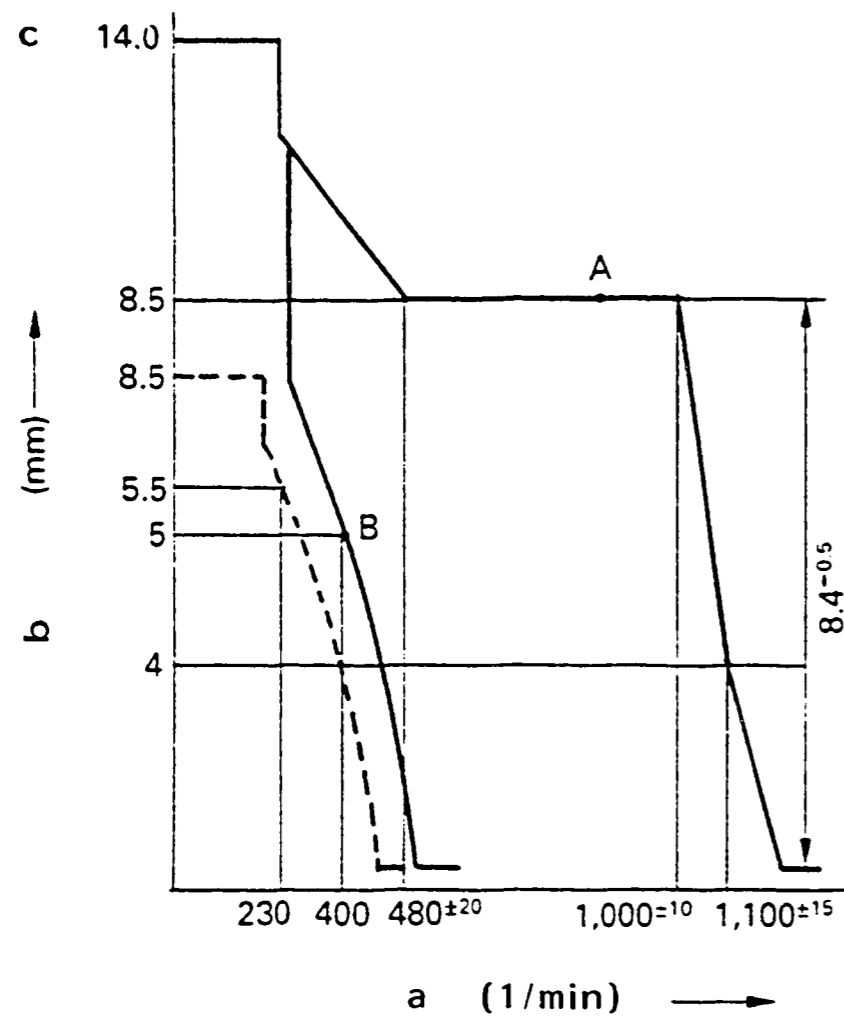


Fig. 7

GOVERNOR ADJUSTMENT

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a = Pump speed  
 b = Control rack position  
 c = above

A = Control lever angle  
 a = Full-speed  
 b = Idling

B = Stop lever angle  
 a = Normal  
 b = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

B4

ZEXEL - Test values  
 Injection pumps



B5

ZEXEL - Test values  
 Injection pumps



■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1000 - 1010	8.5	• Adjust using control lever
	800	8.5	• Adjust using screw (1)
Idling Adjustment	400	5.0	• Fix the control lever
	0	8.5	• Fix the control lever
	230	5.5	• Adjust using spring cap.(3)
Maximum-speed Adjustment	1000 - 1010	8.5	• Adjust using screw (4)
	1095 - 1125	4.0	• Confirm speed droop, adjust using screw (5)
	460 - 500	8.5	• Adjust using spring cap.(2)
	-	-	• Confirm
	-	-	• Confirm
Full-load Adjustment (Install the cover on governor cover)	800	8.5	• Adjust using screw (2)
Control Lever Angle Measurement	<ul style="list-style-type: none"> <li>• Measure the control lever angle at the "idling" and "full" positions.</li> <li>• When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one.</li> <li>• When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.</li> </ul>		

B6

ZEXEL - Test values  
Injection pumps



B7

ZEXEL - Test values  
Injection pumps



■ TIMING SETTING

At No. 1 plunger's beginning of injection position

B.T.D.C.: 18°

■ Note

There is a danger of the swivel lever interfering with the flyweight.  
Strictly observe the following.

The limit when setting the speed at which the governor is actuated is  $N = 1350$ .

At this speed, the maximum number of notches that the adjusting screw can be turned through is 19.

When the rated speed at which the governor is actuated is  $N = 1000$ , the maximum number of notches that the adjusting screw can be turned through is 20.

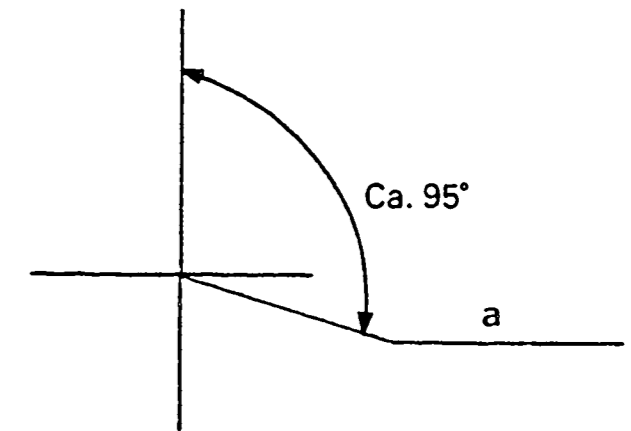


Fig. 8

Pump center line

a = Mark "C-C"

B8

ZEXEL - Test values

Injection pumps



B9

ZEXEL - Test values

Injection pumps



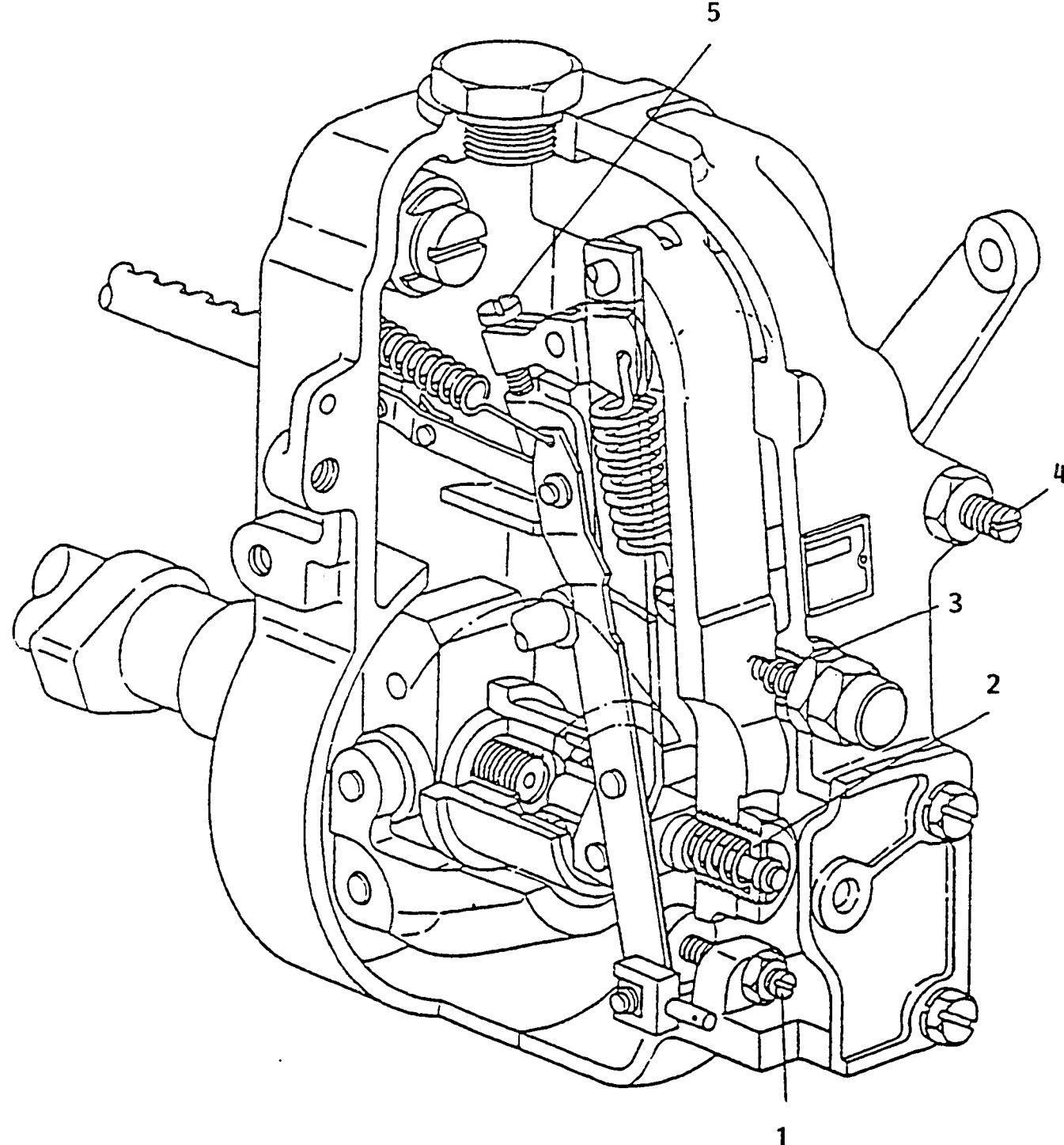


Fig. 9

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- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Screw
- 5 = Screw



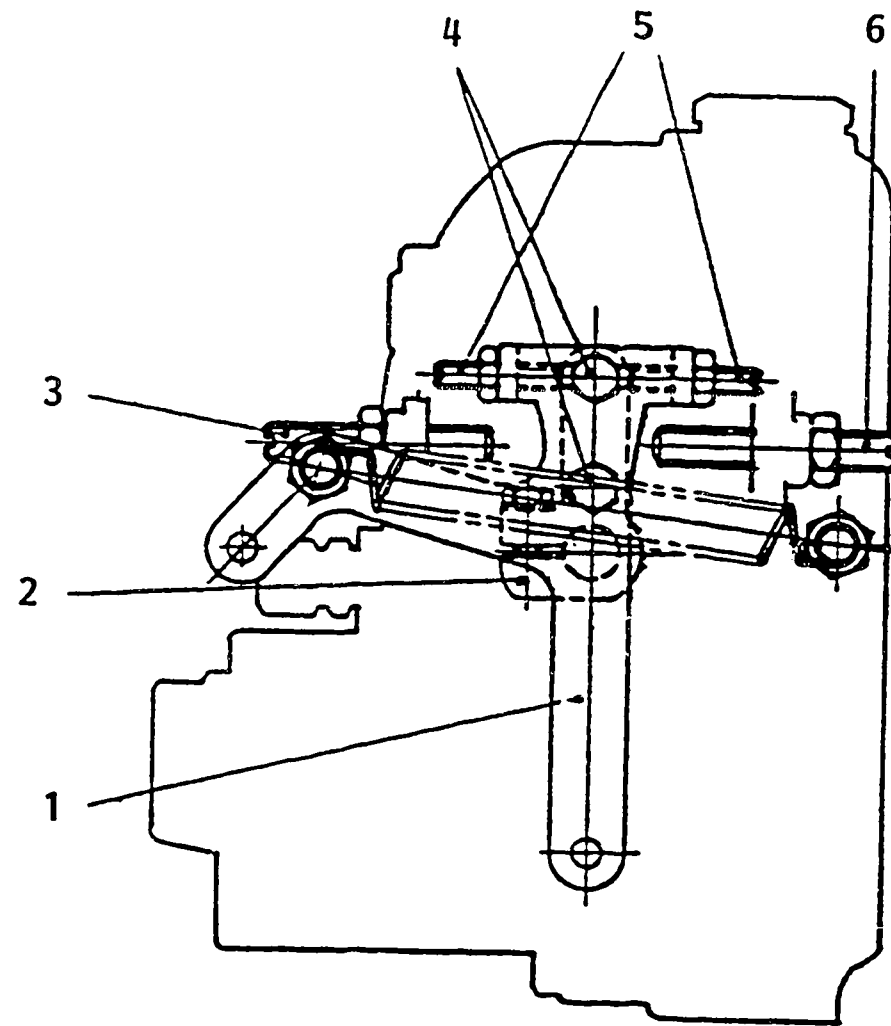


Fig. 10  
1 = Lever  
2 = Lever

3 = Bolt  
4 = Bolt  
5 = Bolt  
6 = Bolt

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#### ■ REDUCTION LEVER ADJUSTMENT

Using bolts (3) and (6), fix lever (2) in the position where pump speed begins to increase.

Then, fix lever (1) at  $18 \pm 1^\circ$  using bolt (5) and then lock it using bolt (4).

After completing idling adjustment, loosen bolt (6) and move lever (1) to the full-speed position. Fix it in this position using bolt (6).

The shape and position of this lever may vary.

**B12**

ZEXEL - Test values  
Injection pumps



**B13**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 116 1/4  
ZEXEL No. : 101602-3780  
Date : 25.06.1990 [0]  
Company : KOMATSU  
Engine : 6D105 / 6136721311

IP-Type number : 101060-2470 / PES6A  
Governor type number : 105410-6670 / EP/RSV

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.3 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1-5-3-6-2-4  
  
Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-60-120-180-240-300  
  
Tolerance +- °C: 0.50 (0.75)

**B14**

ZEXEL - Test values  
Injection pumps



Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.1	1075	47.5 - 49.5	± 2	Rack	Basic
H	approx. 7.1	425	7.0 - 9.0	± 4	Rack	
A	10.1	1075	47.5 - 49.5	± 2	Lever	
B	(11.3)	800	55.5 - 59.5	± 4	Lever	

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							





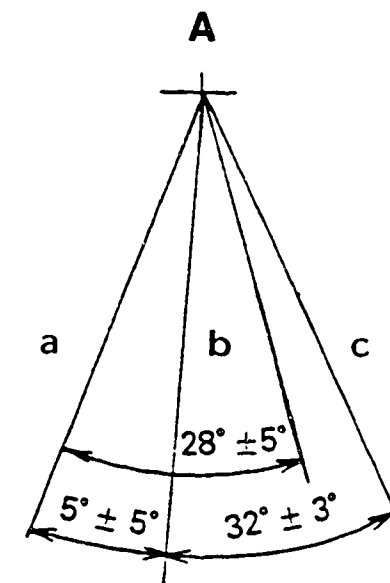
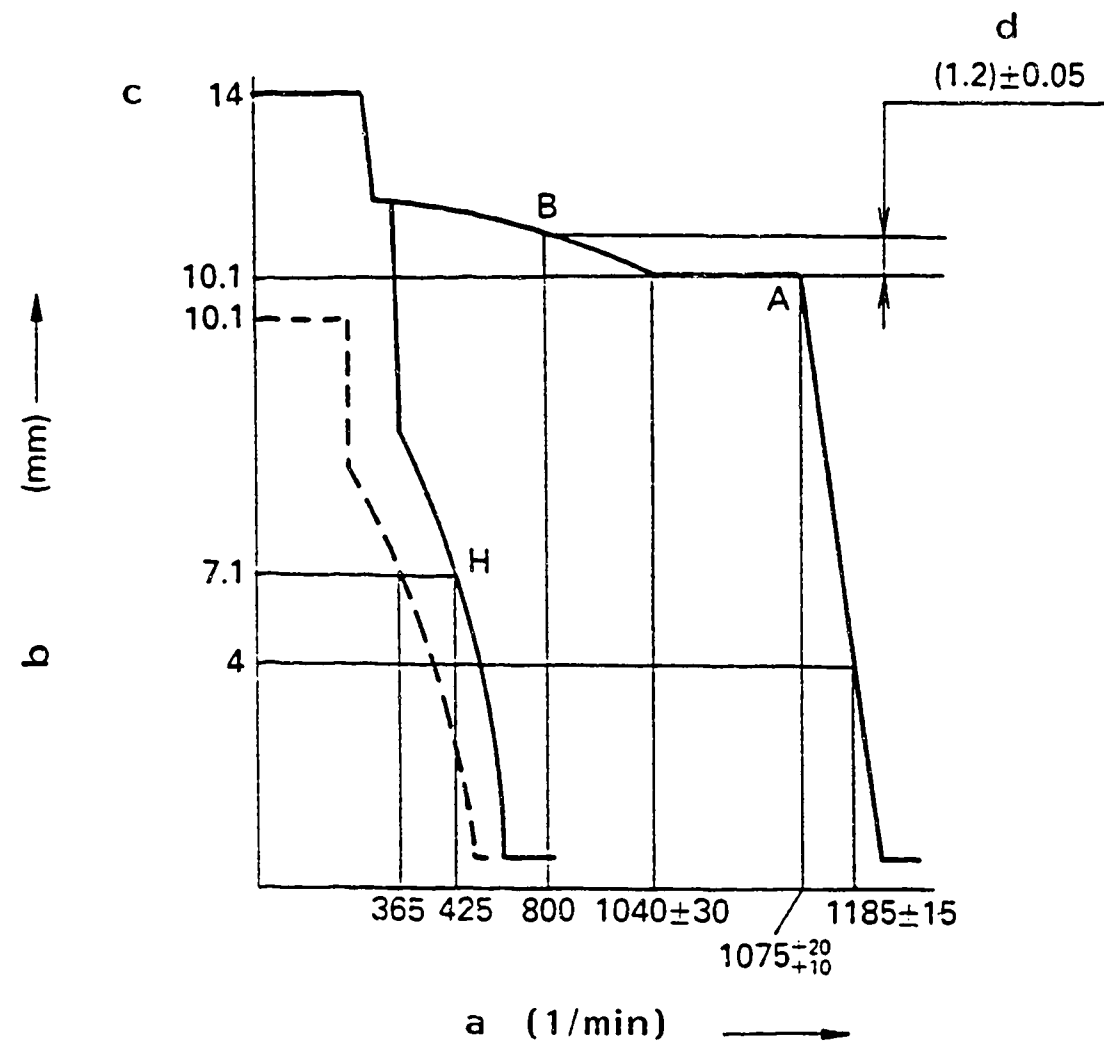


Fig.11

GOVERNOR ADJUSTMENT

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- a = Pump speed
- b = Control rack position
- c = above
- d = Difference in control rack positions between 1075 rpm and 800 rpm

A = Stop lever angle

- a = Full-speed
- b = Idling
- c = Stop

■ Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

**B17**

ZEXEL - Test values  
Injection pumps



**B18**

ZEXEL - Test values  
Injection pumps



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-speed Adjustment (Temporary)	1085 - 1095	10.1	• Adjust using screw (1)
Full-load Adjustment	1075	10.1	• Adjust using screw (5)
Torque Control spring Adjustment	800 1010 - 1070	11.3 10.1	• Adj. using spring cap.(4) • Confirm
Idling Adjustment	425 0 365 -	approx. 7.1 - approx. 7.1 -	• Fix control lever • Freely position the control lever • Adjust using spring capsule (3) • Confirm
Maximum-speed Adjustment	1085 - 1095 1170 - 1200 1250	10.1 4.0 0.1 - 0.6	• Adjust using screw (1) • Adjust speed droop using screw (2) • Confirm
Full-load Adjustment (Install the cover on governor cover)	1075	10.1	• Adjust using screw (1)
Control Lever Angle Measurement	<ul style="list-style-type: none"> <li>• Measure the control lever angle at the "idling" and "full" positions.</li> <li>• When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one.</li> <li>• When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.</li> </ul>		
Rack Limiter Adjustment	-		• Adjust using screw (5)

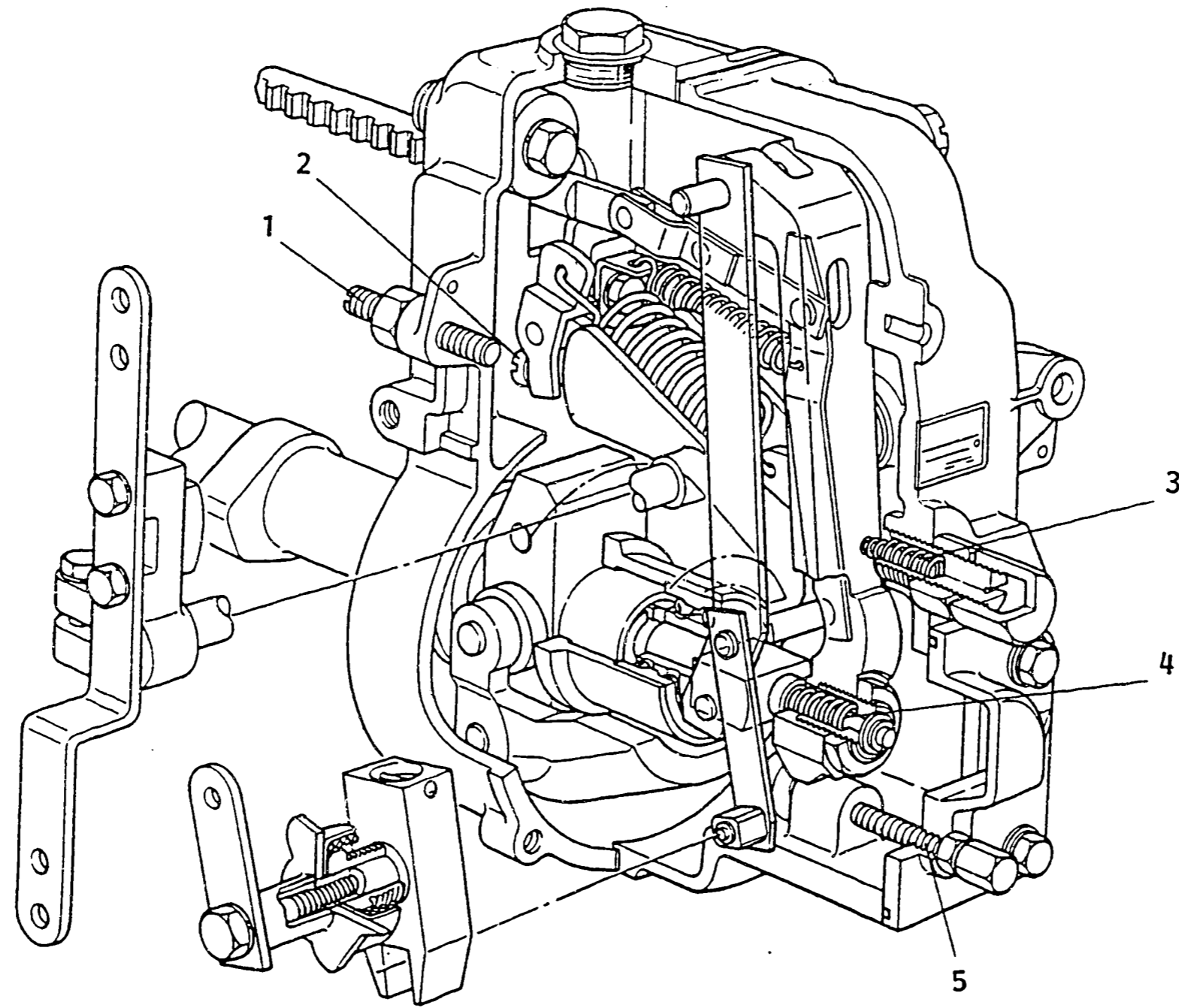


Fig. 12

- 1 = Screw
- 2 = Screw
- 3 = Spring capsule
- 4 = Spring capsule
- 5 = Screw

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**B21**

ZEXEL - Test values  
Injection pumps



**B22**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 103 1/5  
ZEXEL No. : 101692-3051  
Date : 25.06.1990 [4]  
Company : KOMATSU  
Engine : 6D95L / 6206-71-1130

IP-Type number : 101069-9121 / PES6A  
Governor type number : 105400-3090 / EP/RSV

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.6 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1-5-3-6-2-4  
  
Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-60-120-180-240-300  
  
Tolerance +- °C: 0.50 (0.75)

**C1**

ZEXEL - Test values  
Injection pumps



Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.7	1075	30.0 - 32.0	± 2.5	Lever	Basic
B	approx.10.3	350	9.5 - 11.5	± 15	Rack	

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							



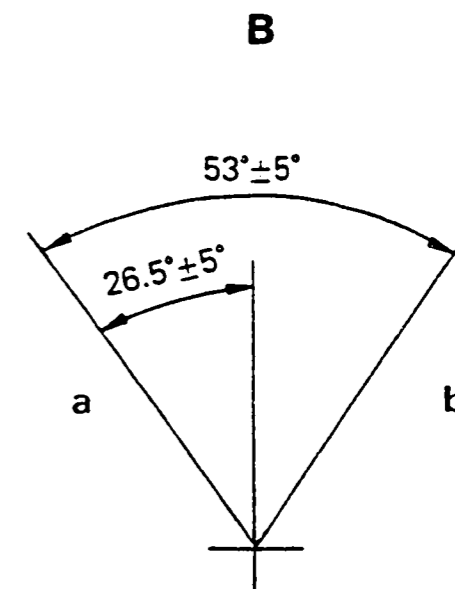
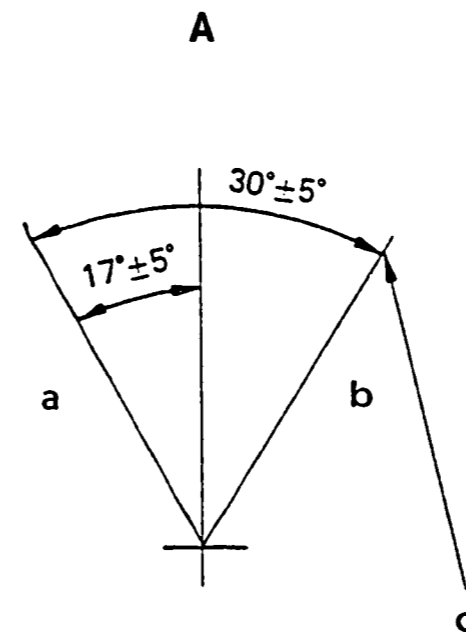
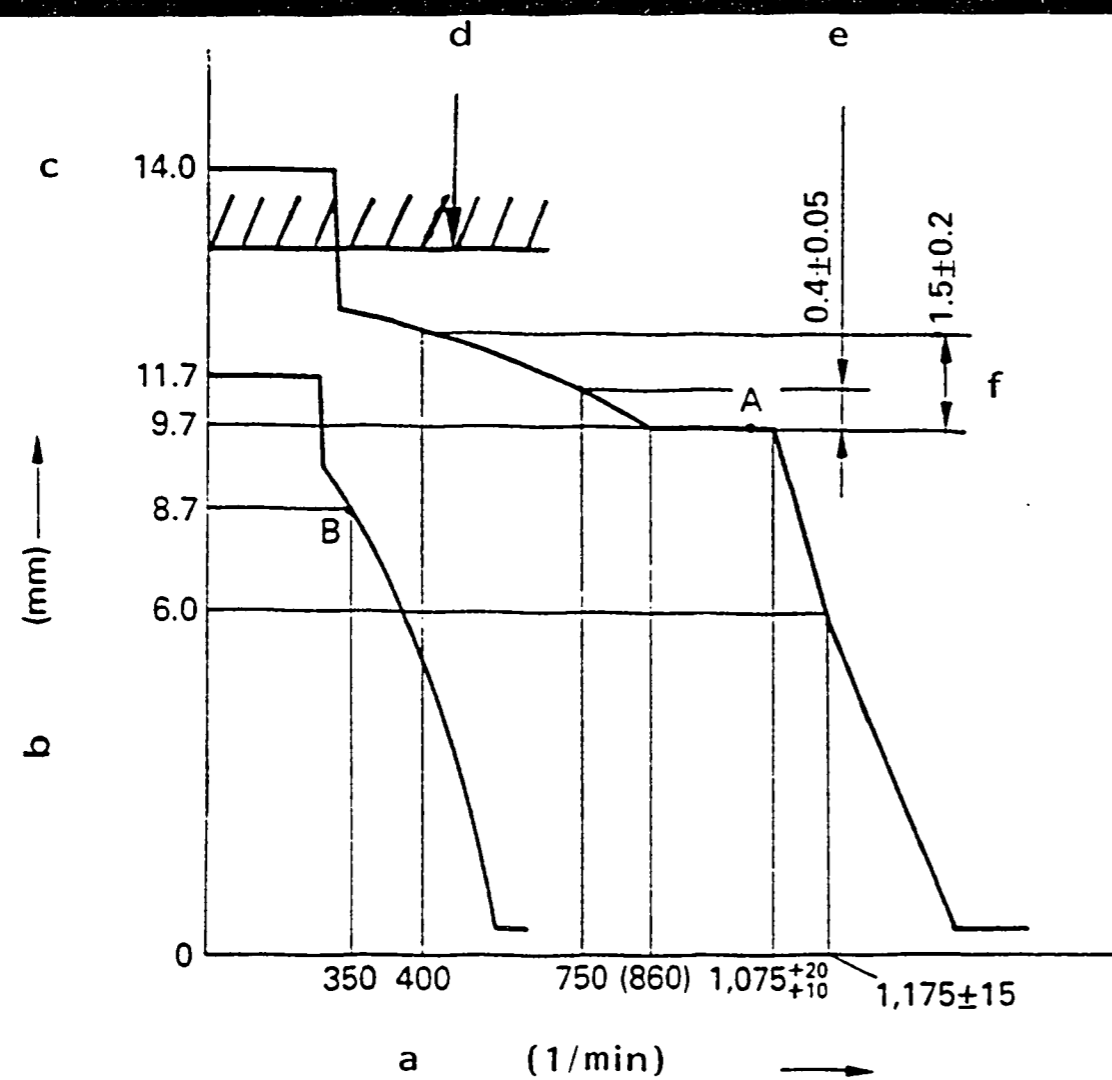


Fig.13

GOVERNOR ADJUSTMENT

101692-3051 2/5

- a = Pump speed
- b = Control rack position
- c = above
- d = Control rack position  
Rack limit: approx. 13 mm
- e = Difference in control rack positions  
between 1075 rpm and 750 rpm
- f = Difference in control rack positions  
between 1075 rpm and 400 rpm

A = Speed control lever angle

B = Stop lever angle

a = Full-speed

a = Normal

b = Idling

b = Stop

c = Stopper bolt set

C4

ZEXEL - Test values  
Injection pumps



C5

ZEXEL - Test values  
Injection pumps



■ Note

1. Before adjustment, remove the idling sub spring and the torque control spring.
2. Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5.- 1.0 mm.
3. There is a danger of the swivel lever interfering with the flyweight. Strictly observe the following.

The limit when setting the speed at which the governor is actuated is  $N = 1300$ .

At this speed, the maximum number of notches that the adjusting screw can be turned through is 10.

When the rated speed at which the governor is actuated is  $N = 1200$ , the maximum number of notches that the adjusting screw can be turned through is 15.

When the rated speed at which the governor is actuated is  $N = 1100$ , the maximum number of notches that the adjusting screw can be turned through is 20.



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-speed Adjustment (Temporary)	1085 - 1095	9.7	<ul style="list-style-type: none"> <li>• Adjust using the control lever</li> <li>• Adjust using screw (1)</li> </ul>
	950	9.7	
Torque Control spring Adjustment	400	11.0 - 11.4	<ul style="list-style-type: none"> <li>• Adj.using spring cap.(2)</li> <li>• Confirm</li> <li>• Confirm</li> <li>• Confirm the torque contr. stroke is <math>1.5 \pm 0.2</math> mm.</li> </ul>
	750	10.0 - 10.2	
	(860)	9.7	
	-	-	
Idling Adjustment	0	11.7	<ul style="list-style-type: none"> <li>• Fix the control lever</li> <li>• Adjust using spring capsule (3)</li> <li>• Confirm</li> </ul>
	350	8.7	
	-	-	
Maximum-speed Adjustment	1065 - 1095	9.7	<ul style="list-style-type: none"> <li>• Adjust using screw (1)</li> <li>• Confirm speed droop, adjust using screw (5)</li> <li>• Confirm</li> <li>• Confirm</li> </ul>
	1150 - 1200	6.0	
Full-load Adjustment (Install the cover on governor cover)	1075	9.7	<ul style="list-style-type: none"> <li>• Adjust using screw (4)</li> </ul>
Control Lever Angle Measurement	<ul style="list-style-type: none"> <li>• Measure the control lever angle at the "idling" and "full" positions.</li> <li>• When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one.</li> <li>• When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.</li> </ul>		
Rack Limiter Adjustment	-	Approx. 13	

C7

ZEXEL - Test values  
Injection pumps



C8

ZEXEL - Test values  
Injection pumps





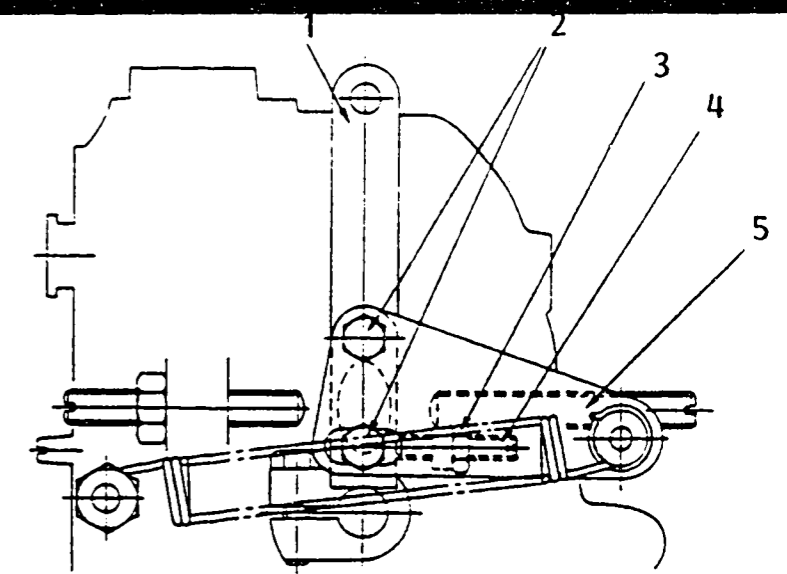


Fig. 14

- 1 = Lever
- 2 = Screw
- 3 = Bolt
- 4 = Screw
- 5 = Lever

### CONTROL LEVER REACTION FORCE ADJUSTMENT

1. Loosen bolt (2) a little.  
Using bolt (4), move the cancel spring's hooking point to find the position specified in the specifications.  
Fix bolt (4) using nut (3), and fix the lever (5) using bolt (2).
2. After adjusting the control lever's reaction force, operate the pump at 350 rpm, gradually move the control lever from the FULL position and confirm that it returns to the idling position.  
Control lever reaction force: 0.4 kg-m.  
This is the force required at high idling ( $1175 \pm 15$  rpm) to move the speed lever from the position where it contacts the stopper bolt when positioned at the FULL side.
3. Confirm that the control lever returns to the idling position when it is moved from the stop position.

C9

ZEXEL - Test values  
Injection pumps



C10

ZEXEL - Test values  
Injection pumps



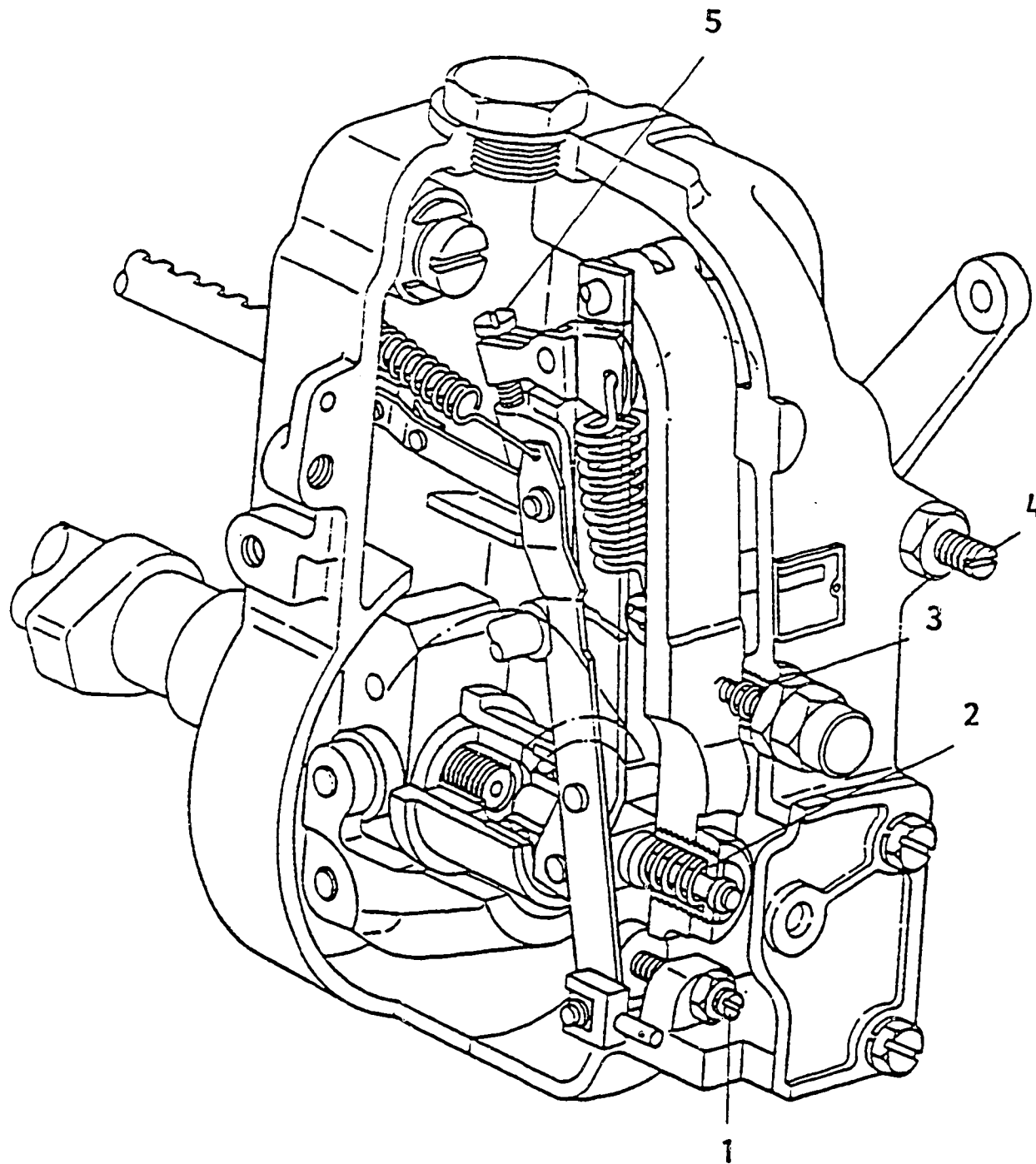
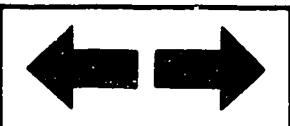


Fig. 15

- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Screw
- 5 = Screw

101692-3051 5/5



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 120 1/4  
ZEXEL No. : 101803-1370  
Date : 25.06.1990 [0]  
Company : MITSUBISHI  
Engine : 8DC40A / 31261-72024

IP-Type number : 101080-0590 / PE8AD  
Governor type number : 105490-4010 / EP/RFD

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.6 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1-2-7-3-4-5-6-8  
Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-45-90-135-180-225-  
270-315  
Tolerance +- °C: 0.50 (0.75)



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
	9.6	800	96.1 - 101.9	-	Rack	Basic
H	approx.7.6	200	17.0 - 23.0	-	Rack	
A	R (approx.9.6)	800	98.0 - 100.0	-	Lever	
B	R (approx.9.6)	1200	$qA+2.0 \leq qB \leq qA+7$	8.2	Lever	
D	-	100	90.0 - 130.0	-	Lever	

Timing Advance Specification : EP/SA  
105641-4190

Speed (rpm)	380	500	900	1200			
Advance Angle (deg)	START	0.5-1.5	3.7-4.7	6.5-7.5			

**C14**

ZEXEL - Test values  
Injection pumps



**C15**

ZEXEL - Test values  
Injection pumps



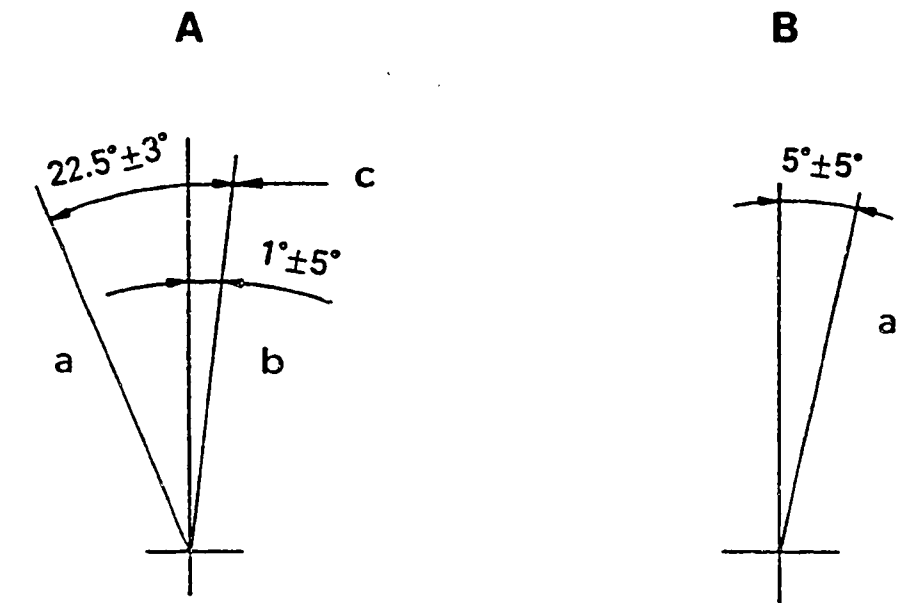
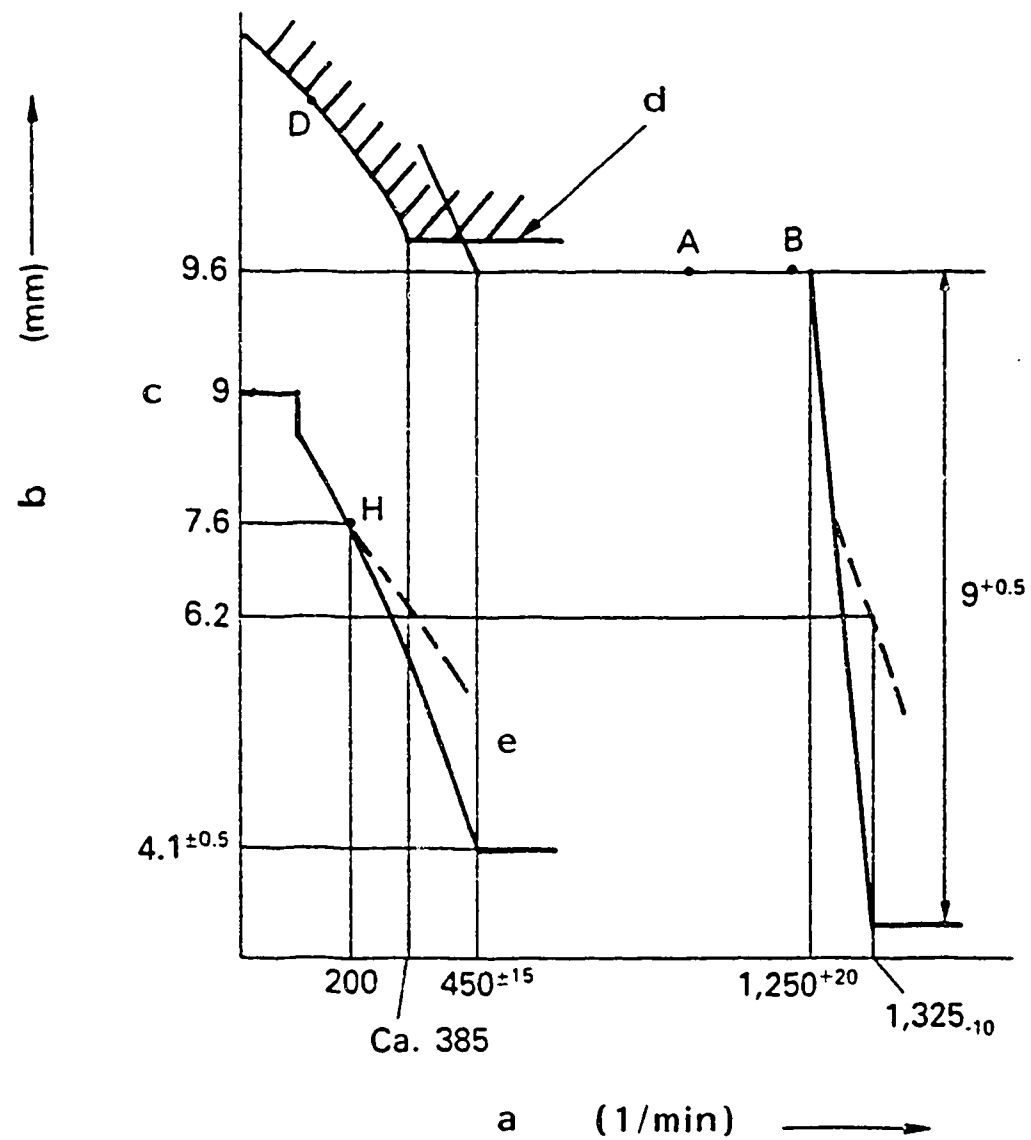


Fig. 16 GOVERNOR ADJUSTMENT

- a = Pump speed
- b = Control rack position
- c = above
- d = Smoke limiter setting:  
9.6<sup>+0.2</sup>
- e = Damper spring set:  
7.0<sup>-0.2</sup>

■ Note

Before adjustment, remove the damper spring, the cover and the idling spring capsule.

A = Load control lever angle

B = Speed control

a = Full Load

a = Full-speed

b = Idling

c = Stopper bolt set



	Pump Speed (rpm)	Rack Position (mm)	Remarks
Flyweight Lift and Full-Load Position	700 - 800	9.6	<ul style="list-style-type: none"> <li>• Speed control lever: temporary setting</li> <li>• Adjust using screw (1)</li> </ul>
	approx. 1400	approx. 0.6	
	Decrease pump speed to $1250^{+20}$ (rpm) and adjust the high speed lift value ( $9.0 + 0.5$ ) using screw (3).		
Idling Adjustment	570 - 600	3.6 - 4.6	<ul style="list-style-type: none"> <li>• Adjust using screw (2)</li> <li>• Adjust using spring cap.(4)</li> <li>• Confirm</li> <li>• Confirm</li> <li>• Confirm the control lever angle is <math>(-4^{\circ} \dots 6^{\circ})</math>.</li> </ul>
	200 435 - 465 200	7.6 3.6 - 4.6 7.6	
Damper Spring Setting	Maintain the pump speed at 200 rpm and set the control rod at the 7.6 mm position using the control lever. Then, gradually increase the pump speed until the rod position is $7.6^{-0.2}$ mm. Tighten the damper spring capsule and fix it in the position where it begins to move the rod from the $7.6^{-0.2}$ mm position.		
Maximum Speed Starting Point and Speed Droop Check	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position		
	1250 - 1270 1315 - 1335 approx.1325	9.6 6.2 -	<ul style="list-style-type: none"> <li>• Adjust using screw (6)</li> <li>• Adjust using spring capsule</li> <li>• No injection</li> </ul>
Micro Switch Adjustment	325 - 330	7.5	<ul style="list-style-type: none"> <li>• Fix the load control lever</li> <li>• Adjust switch "ON", using screw (9).</li> </ul>
Smoke Limiter Setting	Fix the load control lever in the full-load position.		
	400 100	9.6 - 9.8 -	<ul style="list-style-type: none"> <li>• Adjust using smoke limiter.</li> <li>• Confirm injection quantity at point "D".</li> </ul>



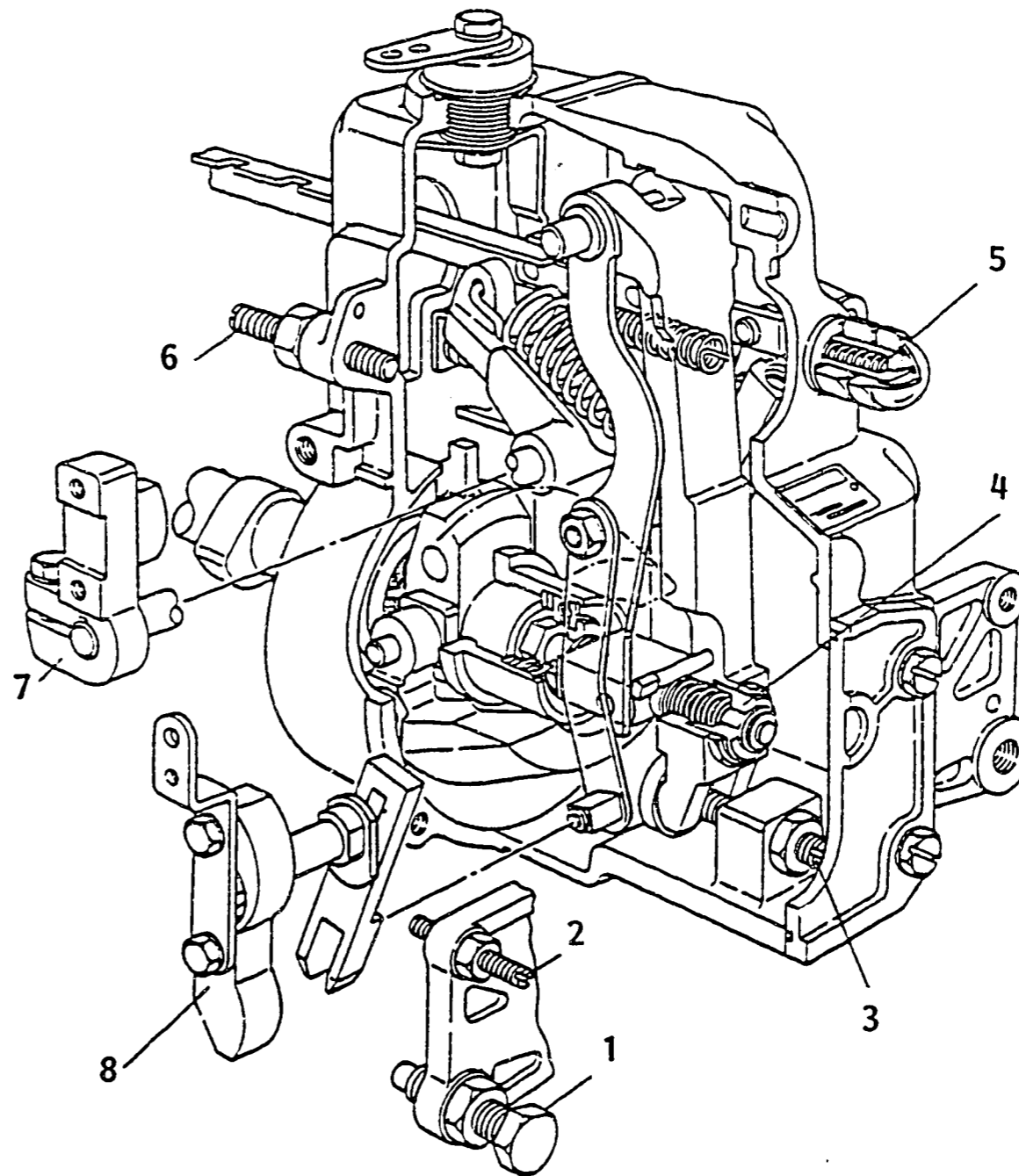
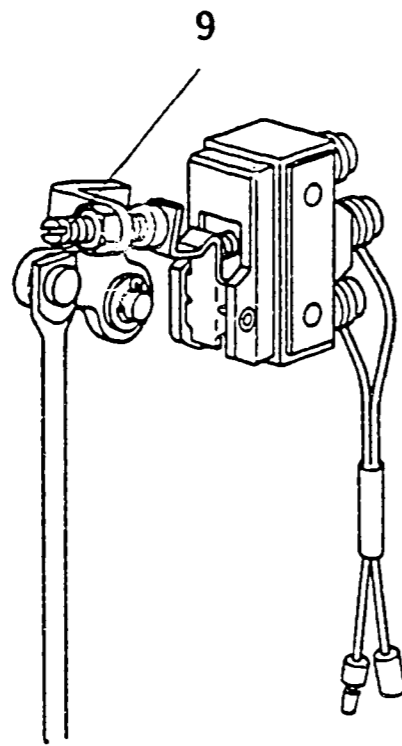


Fig. 17

101803-1370 4/4

- 1 = Screw
- 2 = Screw
- 3 = Screw
- 4 = Spring capsule
- 5 = Damper spring capsule

- 6 = Screw
- 7 = Speed control lever
- 8 = Load control lever
- 9 = Screw

**C20**

ZEXEL - Test values  
Injection pumps



**C21**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No.	:	9 400 610 121	1/3
ZEXEL No.	:	104302-6161	
Date	:	25.06.1990	[0]
Company	:	ISUZU	
Engine	:	2AB1 / 515601-1840	

IP-Type number : 104300-0281 / PES2K  
Governor type number : -

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 2.1 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1 - 2  
  
Port closing mark Cyl. No. : -  
Port closing difference °NW : 0 - 90  
  
Tolerance +- °C: 0.50 (0.75)

D1

ZEXEL - Test values  
Injection pumps





Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.7	1200	44.0 - 46.0	± 2.5	Lever	
B	approx. 5.2	350	5.3 - 7.3	± 14	Rack	
				-		

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

**D2**

ZEXEL - Test values  
Injection pumps



**D3**

ZEXEL - Test values  
Injection pumps



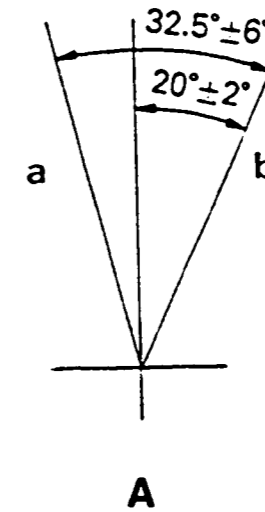
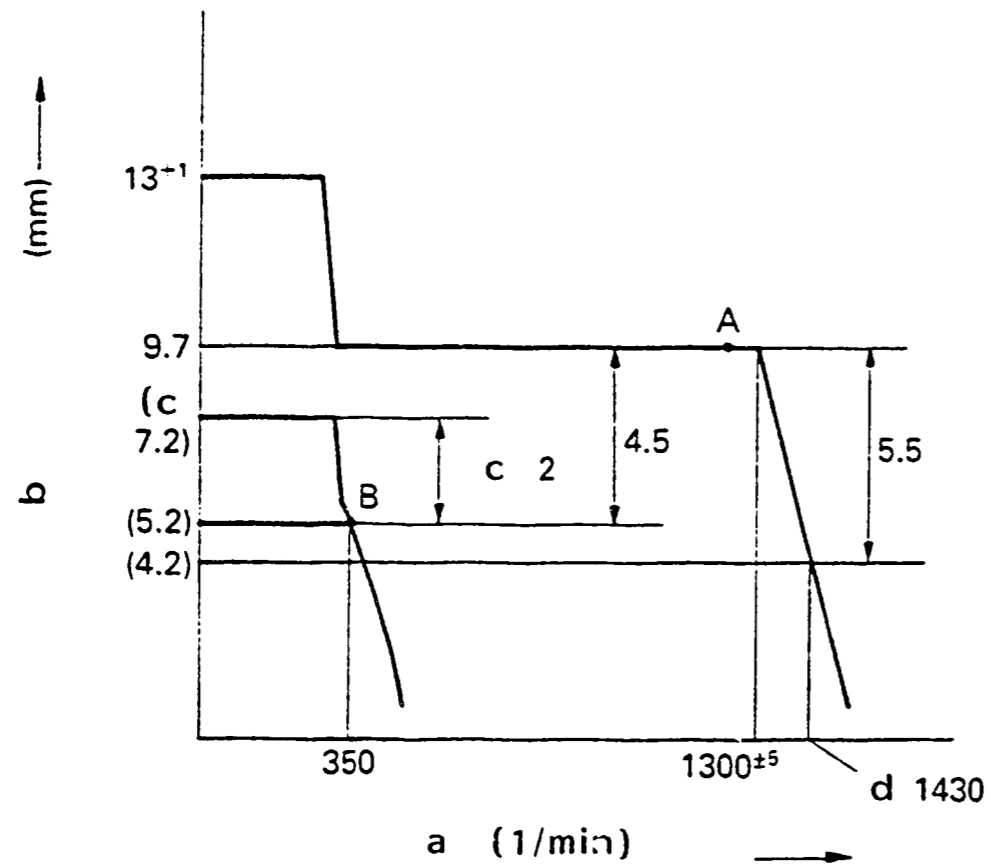


Fig. 18

GOVERNOR ADJUSTMENT

104302-6161 2/3

- a = Pump speed
- b = Control rack position
- c = above
- d = below

- A = Speed control lever angle
- a = Idling
- b = Full-speed

D4

ZEXEL - Test values  
Injection pumps



D5

ZEXEL - Test values  
Injection pumps



ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-Load Stopper Bolt Adjustment	1200	9.7	<ul style="list-style-type: none"> <li>• Adjust using screw (4)</li> <li>• Confirm injection quantity at point A.</li> <li>• Confirm the control lever angle (18° - 22°)</li> </ul>
	1200	9.7	
Maximum Speed Adjustment	Fix the control lever in the full-speed position		
	1295 - 1305 below 1430	9.7 (4.2)	<ul style="list-style-type: none"> <li>• Adjust using screw (4)</li> <li>• Confirm</li> </ul>
Idling adjustment	350	(5.2)	<ul style="list-style-type: none"> <li>• Adjust using idling spring guide</li> <li>• Confirm</li> </ul>
	0	above 7.2	

D6

ZEXEL - Test values  
Injection pumps



D7

ZEXEL - Test values  
Injection pumps



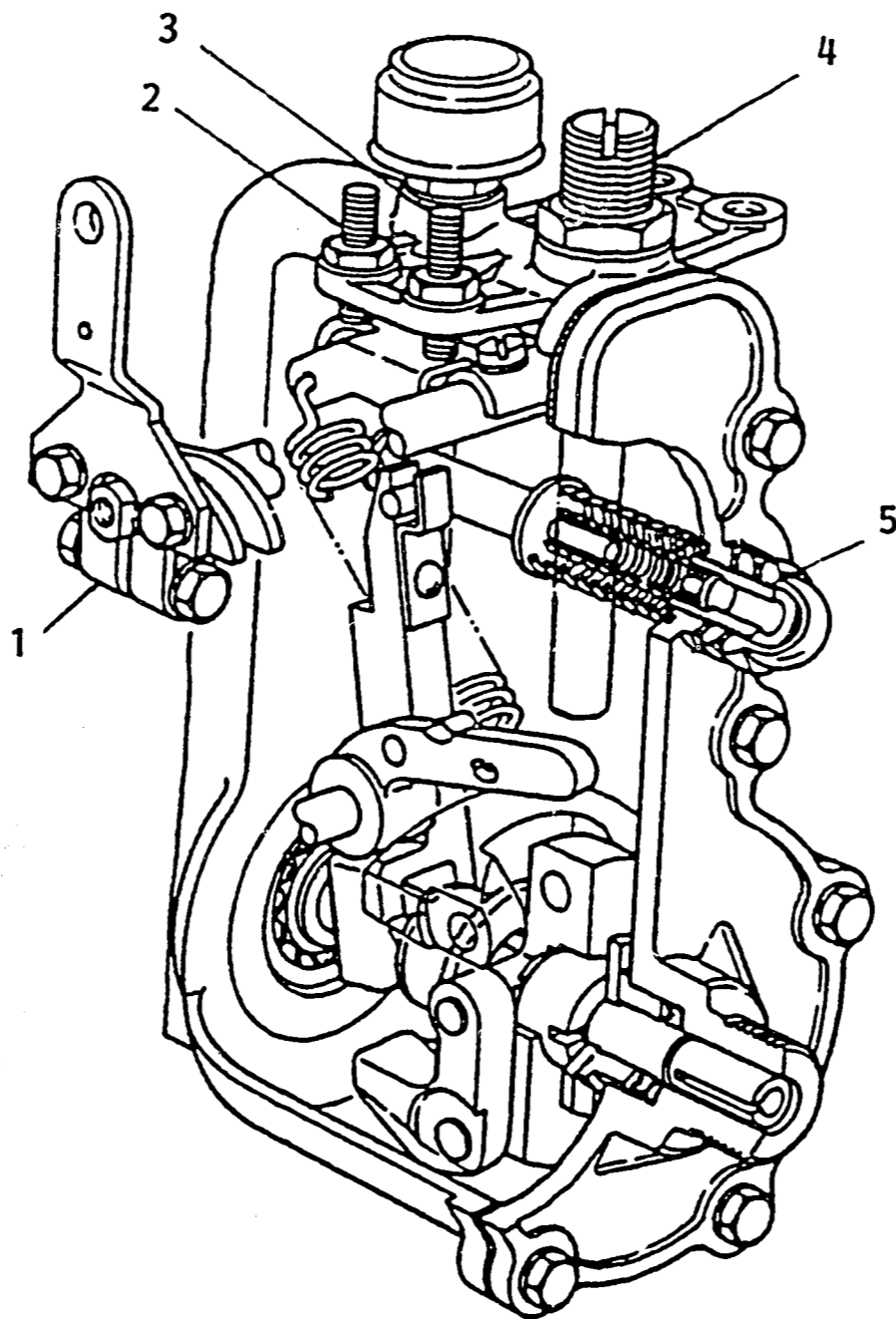


Fig. 19  
1 = Control lever  
2 = Screw  
3 = Screw  
4 = Screw  
5 = Idling spring guide

104302-6161 3/3

**D8**

ZEXEL - Test values  
Injection pumps



**D9**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No.	:	9 400 610 117	1/3
ZEXEL No.	:	104304-3091	
Date	:	25.06.1990	[1]
Company	:	ISUZU	
Engine	:	4FA1 / 515601-3641	

IP-Type number : 104300-4121 / PES4K  
Governor type number : -

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 2.1 ± 0.05  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1 - 3 - 4 - 2

Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-90-180-270

Tolerance +- °C: 0.50 (0.75)

D10

ZEXEL - Test values  
Injection pumps



Continued (Test values)

1/3 1/3 2/3 2/3 3/3 3/3  
 Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.6	1000	26.3 - 29.3	± 2.5	Lever	
B	approx. 8.0	375	7.7 - 9.7	± 14	Lever	
				-		

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

**D11**

ZEXEL - Test values  
 Injection pumps



**D12**

ZEXEL - Test values  
 Injection pumps



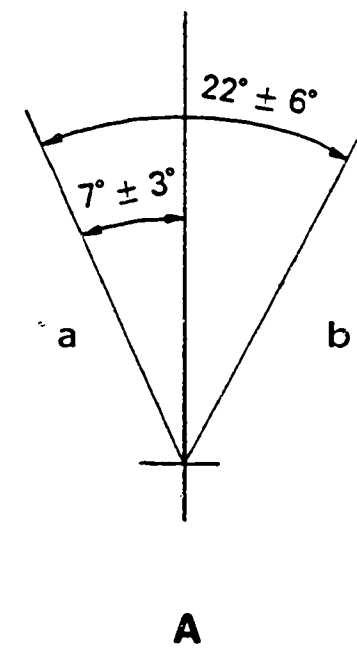
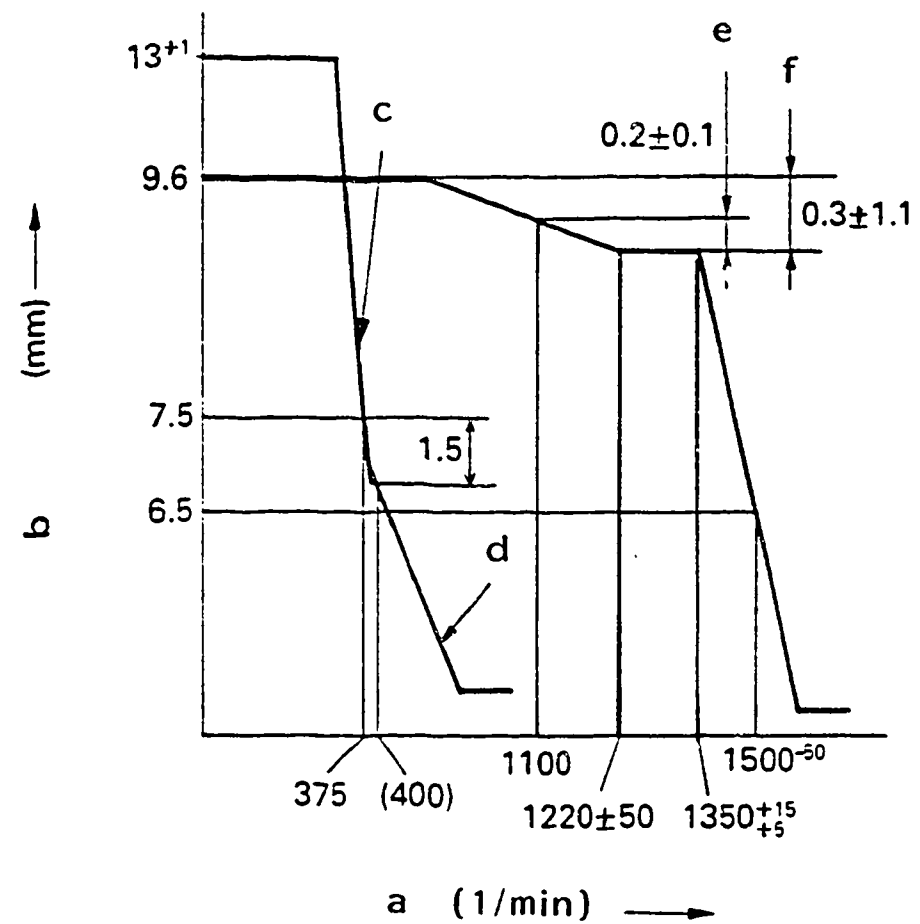


Fig. 20

GOVERNOR ADJUSTMENT

- a = Pump speed
- b = Control rack position
- c = Idle spring set
- d = Main spring set
- e = Difference in control rack positions between 1000 rpm and 1350 rpm
- f = Difference in control rack positions between 1100 rpm and 1350 rpm

A = Speed control lever angle

a = Full-speed  
b = Idling

■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-Load Adjustment (Temporary)	1350	9.6	<ul style="list-style-type: none"> <li>• Adjust using screw (5)</li> <li>• Confirm the control lever angle (4°- 10°)</li> </ul>
Maximum Speed Adjustment	Fix the control lever in the full-speed position		
	1355 - 1365 1450 - 1500	9.6 6.5	<ul style="list-style-type: none"> <li>• Confirm</li> <li>• Adjust using screw (2)</li> </ul>
Idling adjustment	375	7.5	<ul style="list-style-type: none"> <li>• Adjust using idling spring guide</li> <li>• Confirm</li> </ul>
	0	13 <sup>+1</sup>	
Torque Control Spring Adjustment	1000	(9.6)	<ul style="list-style-type: none"> <li>• Move the control lever</li> <li>• Adjust using screw (4)</li> <li>• Torque control stroke 0.2 mm is adjusted by shims.</li> <li>• Confirm the torque control stroke is 0.3 mm.</li> </ul>
	1000	9.6	
	1100	(9.4)	
	1170 - 1270	(9.3)	

D15

ZEXEL - Test values  
Injection pumps



D16

ZEXEL - Test values  
Injection pumps





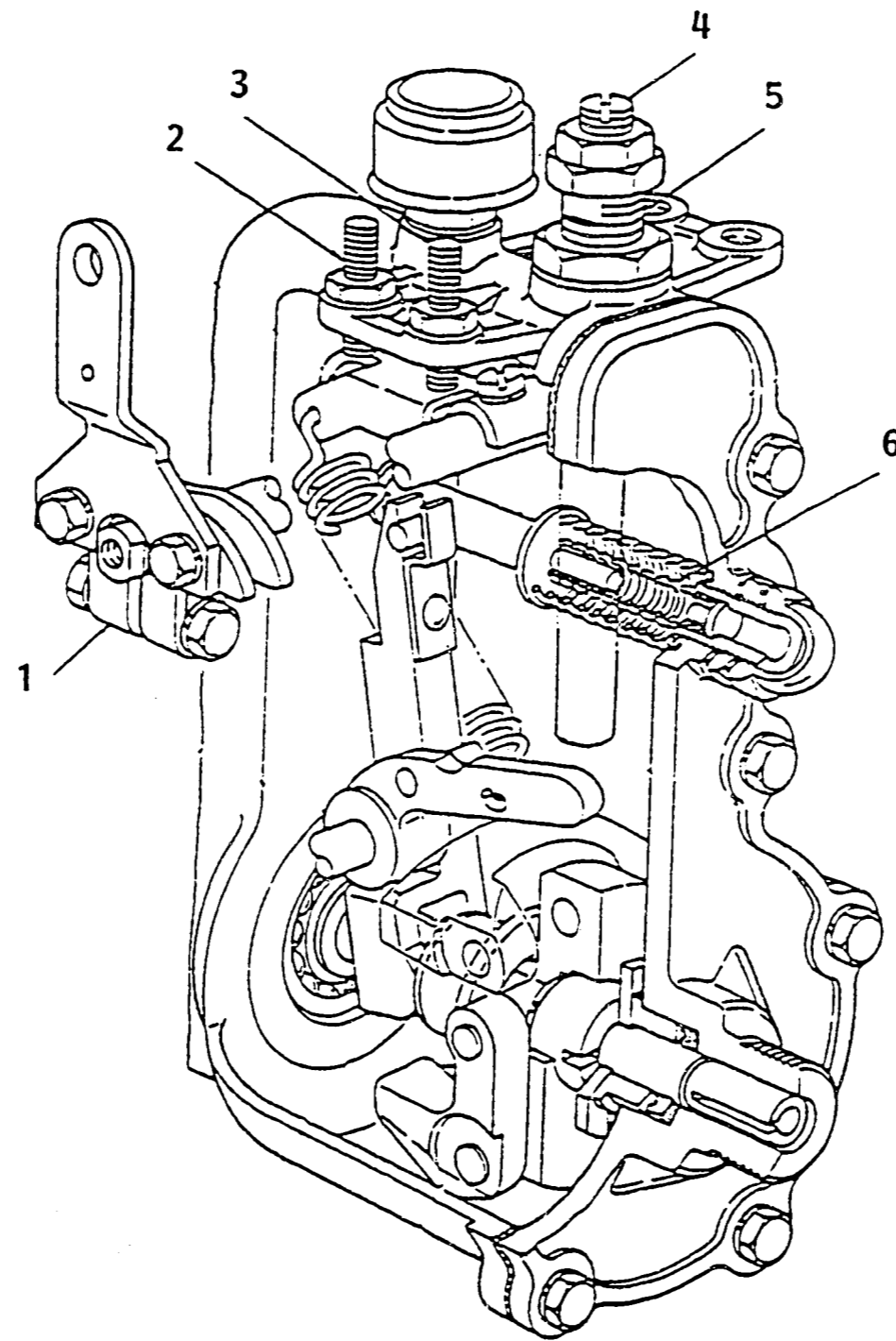


Fig. 21

- 1 = Control lever
- 2 = Screw
- 3 = Screw
- 4 = Screw
- 5 = Screw
- 6 = Idling spring guide

104304-3091 3/3

**D17**

ZEXEL - Test values  
Injection pumps



**D18**

ZEXEL - Test values  
Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model:4FG1

BOSCH No. 9 460 610 418  
ZEXEL No. 104740-1661  
Date: 25.6.1990 (0)  
Company: ISUZU  
No. 8943142451

Injection pump no. 104640-1341 (NP-VE4/10F2200RNP611)

Pump rot.: clockwise-viewed from drive side  
Prestroke setting: 0.2 mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1750	4.0 - 4.4 (mm)		
1-2	Supply pump pressure	1750	5.8 - 6.2 (kg/cm <sup>2</sup> )		
1-3	Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	1250	47.1 - 48.1 (cc/1000st) (cc/1000st)		3.5
1-4	Idle speed regulation	425	8.3 - 12.3 (cc/1000st)		2.0
1-5	Start	100	50.0 - 70.0 (cc/1000st)		
1-6	Full-load speed regulation	2500	11.0 - 17.0 (cc/1000st)		4.5
1-7	Load-timer adjustment	1750			
1-8			Ta=0.8 ± 0.2 mm		

2. Test values

2-1 Timing device	N = rpm mm	1250 1.6 - 2.4	1750 3.9 - 4.5	2150 5.4 - 6.4
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>		1750 5.8 - 6.2	2150 6.5 - 7.1
2-3 Overflow delivery	N = rpm cc/10s		1750 57.0 - 100.0	

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	600	44.6 - 49.6		
	1250	46.6 - 48.6		
	2150	36.5 - 41.5		
	2500	10.5 - 17.5		
	2850	below 5.0		
Switch off	425	0		
Idle stop	425	8.3 - 12.3		
	700	below 3.0		

2-5 Solenoid  
Cut-in voltage max. 12 V  
Test voltage: 8 - 14 V

3. Dimensions

K 3.2 - 3.4 mm  
KF 5.7 - 5.9 mm  
MS 0.8 - 1.0 mm  
BCS - mm

Control lever angle

α -6° - 2° deg  
A mm  
β 33° - 43° deg  
B mm  
γ - deg  
C - mm



## LOAD TIMER ADJUSTMENT

### 1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: - mmHg  
 Pump Speed : 1750 rpm  
 Fuel Injection  
 Quantity : 32 - 33 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (1 - 7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1750	31.5 - 33.5	-	-	0.5 - 1.1
1750	22.0 - 25.0	-	-	1.1 - 2.1

D21

ZEXEL - Test values

Injection pumps

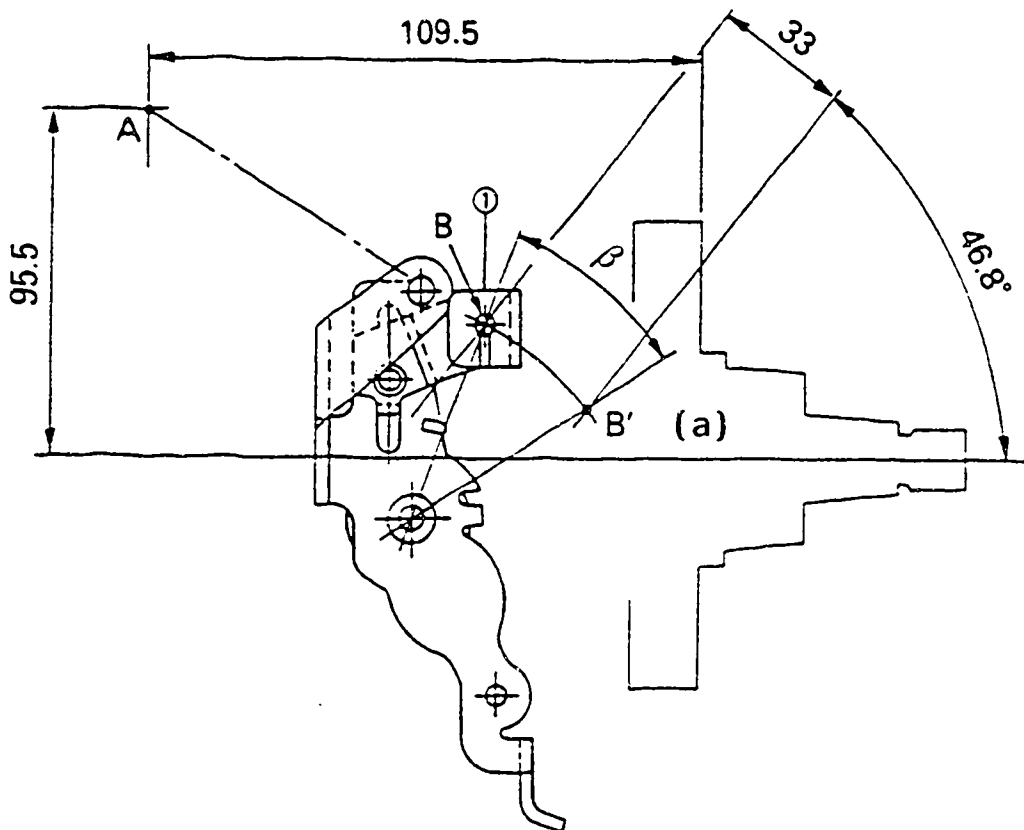


D22

ZEXEL - Test values

Injection pumps





104740-1661 3/3

Fig. 22

(a) = (Full-speed)

### ■ A/T-PLATE ADJUSTMENT

Choose either of 1) or 2) above and perform adjustment.

- 1) Adjust the A/T plate so that when the control lever is rotated from the idle position (B) to the full position (B'),  $AB' - AB = 33 \pm 1$  mm. Then fix the plate.
- 2) Adjust the A/T plate so that when the control lever is rotated from the idle position (B) to the full position (B'), to a position  $46.8^\circ$  from the pump's drive shaft, the distance from B to B' is  $33 \pm 0.5$  mm. Then fix the plate.

**D23**

ZEXEL - Test values

Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model:4D55

BOSCH No. 9 460 610 290  
ZEXEL No. 104740-3350  
Date: 25.6.1990 [1]  
Company: MITSUBISHI  
No. MD071533

Injection pump no. 104640-3150 (NP-VE4/10F2100RNP148)

Pump rot.: clockwise-viewed form drive side  
Prestroke setting: - mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	850	1.1 - 1.5 (mm)		
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm <sup>2</sup> )		
1-3	Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	750	32.2 - 34.2 (cc/1000st) (cc/1000st)		3.0
1-4	Idle speed regulation	375	6.9 - 9.9 (cc/1000st)		2.5
1-5	Start	100	66.0 - 86.0 (cc/1000st)		
1-6	Full-load speed regulation	2550	13.1 - 19.1 (cc/1000st)		4.0
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm mm	850 0.9 - 1.7	1750 6.1 - 7.3	2100 7.8 - 8.6
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	600 2.9 - 3.5	1250 4.5 - 5.1	2100 6.5 - 7.1
2-3 Overflow delivery	N = rpm cc/10s	1250 48.0 - 92.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	750	32.7 - 34.7		
	1250	36.7 - 40.7		
	2100	32.2 - 36.2		
	2550	11.1 - 21.1		
	2900	below 5.0		
Switch off	375	0		
Idle stop	375	6.4 - 10.4		
	600	below 3.0		

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.3 - 1.5 mm
BCS	- mm

Control lever angle

$\alpha$	55 - 63 deg
A	- mm
$\beta$	38 - 48 deg
B	- mm
$\gamma$	- deg
C	- mm

D24

ZEXEL - Test values  
Injection pumps



D25

ZEXEL - Test values  
Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model:4D55 (TC)

BOSCH No. 9 460 610 422  
ZEXEL No. 104740-3470  
Date: 25.6.1990 [1]  
Company: MITSUBISHI  
No. MD073632

Injection pump no. 104640-3160

(NP-VE4/10F2100RNP149)

Pump rot.: clockwise-viewed from drive side  
Prestroke setting: - mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	850	1.1 - 1.5 (mm)	0	
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm <sup>2</sup> )	0	
1-3	Full load deliv. without charge-air pr.	600	32.7 - 33.7 (cc/1000st)	0	2.5
	Full load deliv. with charge-air pres.	750	36.2 - 37.2 (cc/1000st)	100 - 120	
1-4	Idle speed regulation	375	6.4 - 10.4 (cc/1000st)	0	2.5
1-5	Start	100	66.0 - 86.0 (cc/1000st)	0	
1-6	Full-load speed regulation	2650	19.1 - 25.2 (cc/1000st)	615 - 635	6.5
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm mm	850 1.1 - 1.5	1750 6.1 - 7.3	2100 7.8 - 8.6
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	600 2.9 - 3.5	1250 4.5 - 5.1	2100 6.5 - 7.1
2-3 Overflow delivery	N = rpm cc/10s		1250 58.0 - 102.0	

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	600	32.2 - 34.2	0	
	750	35.7 - 37.7	100 - 120	
	1250	49.3 - 53.3	468 - 488	
	2100	42.8 - 47.8	615 - 635	
	2650	18.1 - 26.1	615 - 635	
	3050	below 10	615 - 635	
Switch off	375	0	0	
Idle stop	600	below 3	0	
	375	6.4 - 10.4	0	
Partial load	600	14.5 - 26.5		

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.8 - 1.0 mm
BCS	4.4 - 4.6 mm
Pre-str.	- mm

Control lever angle

α	55 - 63 deg
A	- mm
β	41 - 51 deg
B	- mm
γ	11.5 - 12.5 deg
C	- mm



**Note:**

1. After adjustment of full load fuel injection quantity (600 rpm, 32.7 - 33.7 cc/1000st), set the boost pressure at 100 - 120 mmHg, and at a pump speed of 750 rpm adjust the fuel injection quantity using the BCS spring set screw.
2. Confirm that  $Q$  is within the specifications even when the boost pressure exceeds 700 mmHg.
3. Lever's partial load position.

**D28**

ZEXEL - Test values

Injection pumps



Test oil  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model: 4D56-T

1/2

BOSCH No. 9 460 610 406  
ZEXEL No. 104740-3822  
Date: 25.6.1990 [0]  
Company: MITSUBISHI  
No. MD138252

Injection pump no.:104640-3822

(NP-VE4/10F2100RNP802)

Pump rotation: clockwise-viewed from  
drive side

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	3.5 - 3.9 (mm)	540 - 560	
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm <sup>2</sup> )	540 - 560	
1-3	Full load deliv. without charge air pr.	750(BCS)	61.9 - 62.9 (cc/1000st)	320 - 340	
	Full load deliv. with charge air press.	1250 (FULL)	66.4 - 67.4 (cc/1000st)	540 - 560	4.5
1-4	Idle speed regulation	375	8.5 - 11.5 (cc/1000st)	0	2.0
1-5	Start	100	63.0 - 83.0 (cc/1000st)	0	
1-6	Full-load speed regulation	2650	22.2 - 28.2 (cc/1000st)	540 - 560	5.5
1-7	Load-timer adjustment	1250	(mm)	540 - 560	
1-8			T=0.4 - 0.8 (mm)		

2. Test values

2-1 Timing device	N = rpm mm	500 0.6-1.8	750 1.4-2.6	1250 3.3-4.1	1750 5.2-6.4	2100 6.6-7.8
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>		600 2.9-3.5	1250 4.5-5.1		2100 6.5-7.1
2-3 Overflow delivery	N = rpm cc/10s			1250 48 - 92		

2-4 Fuel injection quantities

Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres(mmHg)	Difference (cc)
End stop	600	42.8 - 47.8	0	
	750 (BCS)	61.4 - 63.4	320 - 340	
	1250(FULL)	65.9 - 67.9	540 - 560	
	2100	59.9 - 64.9	540 - 560	
	2650	21.7 - 28.7	540 - 560	
	3050	below 5.0	540 - 560	
Switch off	375	0	0	
Idle- stop	375	8.0 - 12.0	0	
	750	below 3.0	0	

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.6 - 0.8 mm
BCS	6.0 - 6.2 mm
Prestr.	0.94 - 0.98 mm
Control lever angle	
α	55 - 63 deg
A	9.8 - 16.3 mm
β	35 - 47 deg
B	11.2 - 15.1 mm
γ	- deg
C	- mm
Full-str	7.4 - 8.2 mm

E1

ZEXEL - Test values  
Injection pumps



E2

ZEXEL - Test values  
Injection pumps





## LOAD TIMER ADJUSTMENT

### 1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure:           540 - 560     mmHg  
 Pump Speed     :           1250           rpm  
 Fuel Injection  
 Quantity       :           52.8 - 53.8   cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (1 - 7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	52.3 - 54.3	-	(3 1)	0.2 - 1.0
1250	38.7 - 41.7	-	(2.3)	0.8 - 2.0

- After adjustment of full load fuel injection quantity (1250 rpm, 66.4 - 67.4 cc/1000st) set the boost pressure at 330 mmHg or 0.45 kg/cm<sup>2</sup>, and at a pump speed of 750 rpm adjust the fuel injection quantity using the BCS spring set screw.
- To adjust the timer stroke supply boost pressure of 550 mmHg (0.75 kg/cm<sup>2</sup>), move the control lever to a position where the full-load injection quantity can be obtained, and then adjust the timer stroke.

E3

ZEXEL - Test values  
 Injection pumps



E4

ZEXEL - Test values  
 Injection pumps



Test oil  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES

Distributor pumps  
Engine model: 4D56

1/4

BOSCH No.	9 460 610 431
ZEXEL No.	104740-3831
Date:	25.6.1990 [0]
Company:	mitsubishi
No.	MD138253

Injection pump no.:104640-3831 (NP-VE4/10F2100RNP650)

Pump rot.: clockwise-viewed from drive side Test-nozzle holder combination: Test pressure line:  
Prestroke setting: - mm 1 688 901 000 1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1250	3.5 - 3.9 (mm)	540 - 560	
1-2 Supply pump pressure	1250	4.5 - 5.1 (kg/cm <sup>2</sup> )	540 - 560	
1-3 Full load deliv. with charge air press.	1250	61.4 - 62.4 (cc/1000st)	540 - 560	4.5
Full load deliv. with charge air press.	750	60.4 - 61.4 (cc/1000st)	320 - 340	
1-4 Idle speed regulation	375	10.5 - 13.5 (cc/1000st)	0	2.0
1-5 Start	100	63.0 - 83.0 (cc/1000st)	0	
1-6 Full-load speed regulation	2650	22.2 - 28.2 (cc/1000st)	540 - 560	5.5
1-7 Load-timer adjustment	1250	T=0.4 - 0.8 (mm)	540 - 560	
1-8				

2. Test values

2-1 Timing device	N = rpm mm	500 0.6-1.8	750 1.4-2.6	1250 3.3-4.1	1750 5.2-6.4	2100 6.6-7.8
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	600 2.9-3.5	1250 4.5-5.1	2100 6.5-7.1		
2-3 Overflow delivery	N = rpm cc/10s	1250 48 - 92				

2-4 Fuel injection quantities

Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)
End stop	1250	60.9 - 62.9	540 - 560	
	600	45.8 - 50.8	0	
	750	59.9 - 61.9	320 - 340	
	2100	52.8 - 57.8	540 - 560	
	2650	21.7 - 28.7	540 - 560	
	3050	below 5.0	540 - 560	
Switch off	375	0	0	
Idle-stop	750	below 3.0	0	
	375	10.0 - 14.0	0	

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.9 - 1.1 mm
BCS	3.6 - 3.8 mm
Prestr.	0.84 - 0.88 mm
Control lever angle	
α	19 - 27 deg
A	8.9 - 12.3 mm
β	35 - 47 deg
B	11.2 - 15.1 mm
γ	- deg
C	- mm
Full-str	7.4 - 8.2 mm

E5

ZEXEL - Test values  
Injection pumps



E6

ZEXEL - Test values  
Injection pumps



**Note**

- After adjustment of full load fuel injection quantity (1250 rpm), set the boost pressure at 330 mmHg or 0.45 kg/cm<sup>2</sup>, and at pump speed of 750 rpm adjust the fuel injection quantity using the BCS spring set screw.

**Note**

- To adjust the timer stroke, supply boost pressure of 550 mmHg (0.75 kg/cm<sup>2</sup>), move the control lever to a position where the full-load injection quantity can be obtained, and then adjust the timer stroke.

- **POTENTIOMETER ADJUSTMENT**

Under the following conditions, alter the potentiometer's installation position so that the out-put voltage equals the specified value.

Adjustment Conditions			Specified Value	Remarks
Control lever position	Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Out-put voltage (V)	
Measure	750	21.3 - 23.3	4.0 ± 0.03	Adjust. point
Idle	-	-	above 1	Check point
Full speed	-	-	(8.6)	Check point

(In-put voltage: 10V)

**E7**

ZEXEL - Test values  
Injection pumps

**E8**

ZEXEL - Test values  
Injection pumps



1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: 540 - 560 mmHg  
 Pump Speed : 1250 rpm  
 Fuel Injection  
 Quantity : 49.8 - 50.8 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values.

2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	49.3 - 51.3	540 - 560	(3 1)	0.2 - 1.0
1250	38.7 - 41.7	540 - 560	(2.3)	0.8 - 2.0

E9

ZEXEL - Test values  
 Injection pumps



E10

ZEXEL - Test values  
 Injection pumps



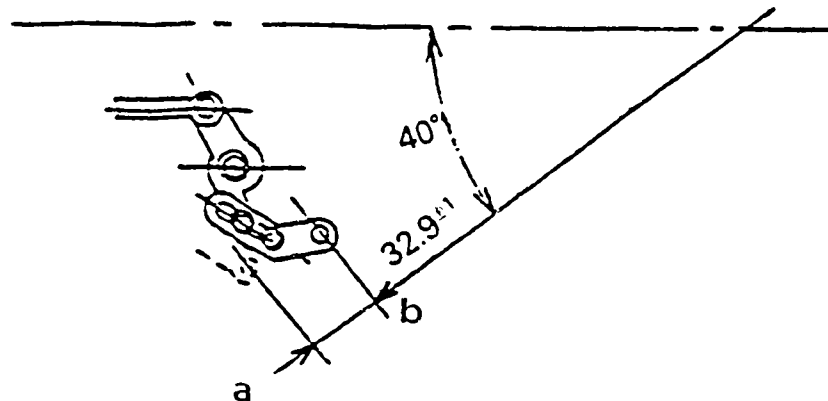


Fig. 23

104740-3831 4/4

a = Full-speed

b = Idling

■ A/T LINK LEVER ADJUSTMENT

1. Move the control lever from the idling position to the full speed position and confirm that the A/T lever stroke (L) is

$32.9 \pm 1$  mm.

2. If dimension L is not as specified, loosen the bolt and adjust by altering the A/T lever position.
3. After adjustment, securely tighten the bolt.



Test oil  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model: 4D56

1/2

BOSCH No. 9 460 610 432  
ZEXEL No. 104740-3881  
Date: 25.6.1990 [2]  
Company: MITSUBISHI  
No. MD147939

Injection pump no.:104640-3881

(NP-VE4/10F2000RNP825)

Pump rot.: clockwise-viewed from drive side  
Prestroke setting: mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1250	4.3 - 4.7 (mm)		
1-2 Supply pump pressure	1250	4.5 - 5.1 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge air pr. Full load deliv. with charge air press.	1250	45.3 - 46.3 (cc/1000st)		3.0
1-4 Idle speed regulation	375	8.5 - 11.5 (cc/1000st)		2.0
1-5 Start	100	63.0 - 83.0 (cc/1000st)		
1-6 Full-load speed regulation	2150	15.1 - 21.1 (cc/1000st)		4.0
1-7 Load-timer adjustment	1250	T=0.6 ± 0.2 (mm)		
1-8				

2. Test values

2-1 Timing device	N = rpm mm	500 1.6-2.4	750 2.4-3.2	1250 4.2-4.8	1750 6.0-7.2	2000 7.1-8.0
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>			1250 4.5-5.1	2000 6.3-6.9	
2-3 Overflow delivery	N = rpm cc/10s			1250 48 - 92		
2-4 Fuel injection quantities						
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)		
End stop	600	42.3 - 46.3				
	1250	44.8 - 46.8				
	1750	38.2 - 42.2				
	2000	37.1 - 41.3				
	2150	14.6 - 21.6				
	2500	below 5.0				
Switch off	375	0				
Idle-stop	375	8.5 - 11.5				
	600	below 5.0				
	750	below 3.0				
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V					

3. Dimensions

K 3.2 - 3.4 mm  
KF 5.7 - 5.9 mm  
MS 1.1 - 1.3 mm  
BCS - mm

Control lever angle

α 55 - 63 deg  
A 10.5 - 16.0 mm  
β 40 - 50 deg  
B 12.1 - 16.1 mm  
γ - deg  
C - mm

E12

ZEXEL - Test values  
Injection pumps



E13

ZEXEL - Test values  
Injection pumps



## LOAD TIMER ADJUSTMENT

### 1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure:	-	mmHg
Pump Speed :	1250	rpm
Fuel Injection		
Quantity :	35.5 ± 0.5	cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values.

### 2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	34.5 - 36.5	-		0.3 - 0.9
1250	26.5 - 29.5	-		0.9 - 1.9

E14

ZEXEL - Test values  
Injection pumps



E15

ZEXEL - Test values  
Injection pumps



Test oil  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model: 4D56

1/2

BOSCH No. 9 460 610 435  
ZEXEL No. 104740-3990  
Date: 25.6.1990 (0)  
Company: MITSUBISHI  
No. MD155267

Injection pump no.:104640-3990

(NP-VE4/10F2100RNP824)

Pump rot.: clockwise viewed from drive side  
Prestroke setting: mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1250	4.3 - 4.7 (mm)		
1-2 Supply pump pressure	1250	4.5 - 5.1 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge air pr. Full load deliv. with charge air press.	1250	45.3 - 46.3 (cc/1000st)		3.0
1-4 Idle speed regulation	375	8.5 - 11.5 (cc/1000st)		2.0
1-5 Start	100	63.0 - 83.0 (cc/1000st)		
1-6 Full-load speed regulation	2550	15.1 - 21.1 (cc/1000st)		4.0
1-7 Load-timer adjustment	1250			
1-8		T=0.6 ± 0.2 (mm)		

2. Test values

2-1 Timing device	N = rpm mm	500 1.6-2.4	750 2.4-3.2	1250 4.2-4.8	1750 6.0-7.2	2100 7.4-8.2
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>			1250 4.5-5.1		2100 6.5-7.1
2-3 Overflow delivery	N = rpm cc/10s			1250 48 - 92		
2-4 Fuel injection quantities						
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)		
End stop	600	42.3 - 46.3				
	1250	44.8 - 46.8				
	1750	38.2 - 42.2				
	2100	37.1 - 41.3				
	2550	14.6 - 21.6				
	2900	below 5.0				
Switch off	375	0				
Idle-stop	375	8.5 - 11.5				
	600	below 5.0				
	750	below 3.0				
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V					

3. Dimensions

K 3.2 - 3.4 mm  
KF 5.7 - 5.9 mm  
MS 1.1 - 1.3 mm  
Stroke (timer) 7.4 - 8.2 mm

Control lever angle

α 55 - 63 deg  
A mm  
β 39 - 51 deg  
B mm  
γ - deg  
C - mm

E16

ZEXEL - Test values  
Injection pumps



E17

ZEXEL - Test values  
Injection pumps





## LOAD TIMER ADJUSTMENT

### 1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure:	-	mmHg
Pump Speed :	1250	rpm
Fuel Injection		
Quantity :	35.5 ± 0.5	cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values.

### 2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	34.5 - 36.5	-		0.3 - 0.9
1250	26.5 - 29.5	-		0.9 - 1.9

## FICD MOUNTING POSITION ADJUSTMENT

1. Hold the control lever in the idling position.

2. Position the FICD mounting bracket so that the gap between the control lever and the FICD lever is 1 + 1 mm.

**E18**

 ZEXEL - Test values  
 Injection pumps

**E19**

 ZEXEL - Test values  
 Injection pumps


Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model:SD25

BOSCH No. 9 460 610 412  
ZEXEL No. 104740-4734  
Date: 25.6.1990 [4]  
Company: NISSAN DIESEL  
No. 1670010H04

Injection pump no. 104640-4733 (NP-VE4/10F1200RNP371)

Pump rot.: clockwise-viewed form drive side  
Prestroke setting: 0.26 - 0.30 mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	900	1.7 - 2.1 (mm)		
1-2 Supply pump pressure	900	4.1 - 4.5 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	900	36.7 - 37.7 (cc/1000st) (cc/1000st)		3.5
1-4 Idle speed regulation	350	8.0 - 12.0 (cc/1000st)		3.0
1-5 Start	100	45.0 - 80.0 (cc/1000st)		
1-6 Full-load speed regulation	1400	9.1 - 15.1 (cc/1000st)		3.5
1-7 Load-timer adjustment				
1-8				

2. Test values

2-1 Timing device	N = rpm mm	900 1.6 - 2.2	1200 2.7 - 3.9	1450 3.5 - 4.7
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	900 4.0 - 4.6	1200 4.8 - 5.4	
2-3 Overflow delivery	N = rpm cc/10s	900 42.0 - 85.0		

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.9 - 1.1 mm
BCS	- mm

Control lever angle

$\alpha$	21.0 - 29.0 deg
A	4.0 - 9.2 mm
$\beta$	37.0 - 47.0 deg
B	10.7 - 14.8 mm
$\gamma$	- deg
C	- mm

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	600	33.2 - 37.2		
	900	36.2 - 38.2		
	1200	38.0 - 42.2		
	1400	8.6 - 15.6		
	1500	below 3.0		
Switch off	350	0		
Idle stop	350	8.0 - 12.0		
	400	below 3.0		

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

E20

ZEXEL - Test values  
Injection pumps



E21

ZEXEL - Test values  
Injection pumps



Test oil  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model:TD25

BOSCH No. 9 460 610 430  
ZEXEL No. 104740-7260  
Date: 25.6.1990 [0]  
Company: NISSAN DIESEL  
No. 16700 21T13

Injection pump no.: 104640-7260

(NP-VE4/10F2150RNP806)

Pump rotation: clockwise viewed from  
drive side

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1100	S/T ON 3.9 - 4.7 (mm) OFF 2.4 - 2.8 (kg/cm <sup>2</sup> )	*) S/T = Solenoid timer	3.0
1-2	Supply pump pressure	1100	S/T ON 4.5 - 5.3 (mm) OFF 3.5 - 4.1 (kg/cm <sup>2</sup> )		
1-3	Full load deliv. without charge air pre Full load deliv. with charge air press.	1100	48.0 - 49.0 (cc/1000st) (cc/1000st)		
1-4	Idle speed regulation	350	4.5 - 8.5 (cc/1000st)		
1-5	Start	100	45.0 - 80.0 (cc/1000st)		
1-6	Full-load speed regulation	2500	10.1 - 14.1 (cc/1000st)		
1-7	Load-timer adjustment	1100	T=1.0 ± 0.2 (mm)		

2. Test values

2-1 Timing device	Solenoid timer N = rpm mm	ON		OFF		
		1100 3.8-4.8	1700	1100 2.3-2.9	1700 4.3-5.5	2300 6.0-7.0
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	1100 4.5-5.3	1700 5.9-6.7	1100 3.5-4.1	1700 4.9-5.5	2150 5.8-6.4
2-3 Overflow delivery	N = rpm <sup>-1</sup> cc/10s	1100 43.0-87.0	1100 60-103	without O-ring		
2-4 Fuel injection quantities						
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)		
End stop	1100	47.5 - 49.5				
	600	45.1 - 49.1				
	2150	38.5 - 42.7				
	2300	28.3 - 37.3				
	2500	9.6 - 14.6				
	2700	below 5.0				
Switch off	350	0				
Idle- stop	350	4.5 - 8.5				
	450	below 3.0				
2-5 Solenoid	Cut-in voltage max.: 8 V Test voltage: 12 - 14 V					

3. Dimensions

K	3.2 - 3.7 mm
KF	5.7 - 5.9 mm
MS	0.9 - 1.1 mm
BCS	- mm
Prestr.	- mm
Control lever angle	
α	50.0 - 58.0 deg
A	10.7 - 14.2 mm
β	31.0 - 41.0 deg
B	9.3 - 12.9 mm
γ	- deg
C	- mm



**Note**

If there is no designation in the specifications for the Solenoid Timer's ON - OFF position, then the position should be regarded as OFF.

■ **LOAD TIMER ADJUSTMENT**

1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure:                    -                    mmHg  
 Pump Speed        :                    1100                    rpm  
 Fuel Injection  
 Quantity         :                    37.5 - 38.5           cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (1 - 7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1100	37.0 - 39.0	-	-	0.7 - 1.3
1100	28.5 - 31.5	-	-	1.2 - 2.2

**E24**

ZEXEL - Test values

Injection pumps

**E25**

ZEXEL - Test values

Injection pumps



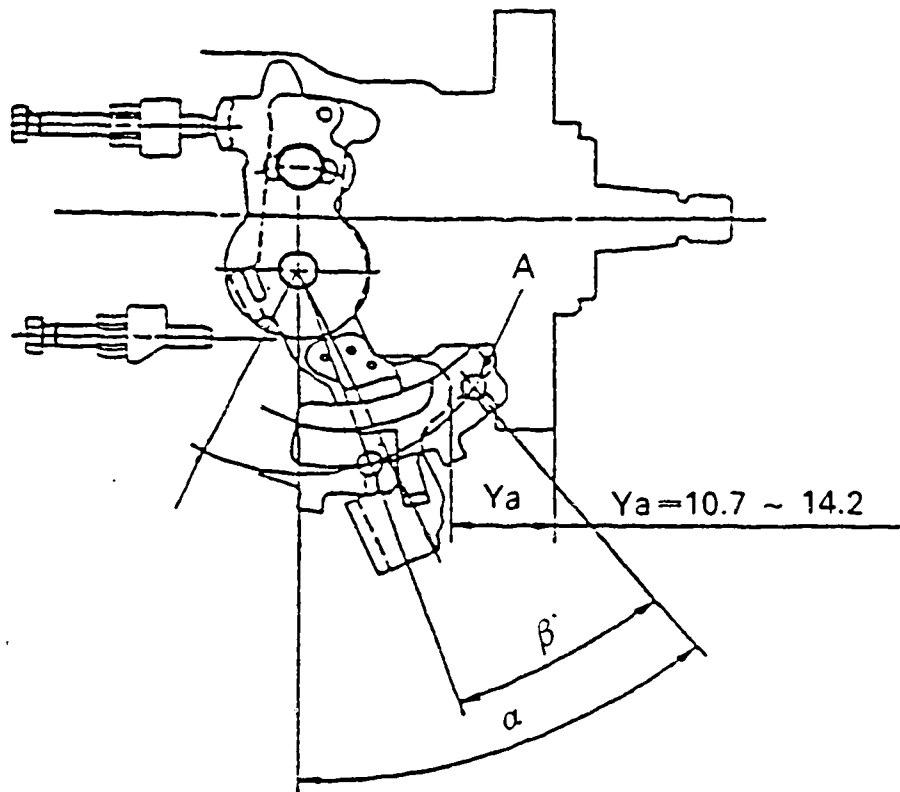


Fig. 24

104740-7260 3/3

**CONTROL LEVER ANGLE MEASUREMENT POSITION**

- 1) Measure the control lever angles ( $\alpha$ ,  $\beta$ ,  $\gamma$ ) at hole A.

**E26**

ZEXEL - Test values

Injection pumps



Test oil  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model:TD23

1/2

BOSCH No.	9 460 610 436
ZEXEL No.	104740-9811
Date:	25.6.1990 [1]
Company:	NISSAN DIESEL
No.	16700 21T08

Injection pump no.: 104640-9811

(NP-VE4/10F2150RNP694)

Pump rotation: clockwise viewed from  
drive side

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1100	S/T ON 3.8 - 4.6 (mm) OFF 2.3 - 2.7 (kg/cm <sup>2</sup> )	*) S/T = Solenoid timer	3.0
1-2	Supply pump pressure	1100	S/T ON 4.5 - 5.3 (mm) OFF 3.5 - 4.1 (kg/cm <sup>2</sup> )		
1-3	Full load deliv. without charge air pre Full load deliv. with charge air press.	1100	44.1 - 45.1 (cc/1000st) (cc/1000st)		
1-4	Idle speed regulation	350	4.5 - 8.5 (cc/1000st)		
1-5	Start	100	45.0 - 80.0 (cc/1000st)		
1-6	Full-load speed regulation	2350	28.3 - 32.3 (cc/1000st)		
1-7					

2. Test values

2-1 Timing device	Solenoid timer N = rpm mm	ON		OFF		
		1100	1700	1100	1700	2550
		3.7-4.7	5.4-7.0	2.2-2.8	4.0-5.2	6.4-7.4
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	1100	1700	1100	1700	2150
		4.5-5.3	5.9-6.7	3.5-4.1	4.9-5.5	5.8-6.4
2-3 Overflow delivery	N = rpm <sup>-1</sup> cc/10s	1100	1100	without O-ring		
		43.0-87.0	60-103			
2-4 Fuel injection quantities						
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)		Charge-air pres (mmHg)	Difference (cc)	
End stop	600	41.5 - 45.5				
	1100	43.6 - 45.6				
	2150	35.9 - 40.1				
	2350	27.8 - 32.8				
	2550	5.4 - 12.4				
	2700	below 5.0				
Switch off	350	0				
Idle- stop	350	4.5 - 8.5				
	450	below 3.0				
2-5 Solenoid	Cut-in voltage max.: 8 V Test voltage: 12 - 14 V					

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.9 - 1.1 mm
BCS	- mm
Prestr.	- mm
Control lever angle	
α	50.0 - 58.0 deg
A	10.7 - 14.2 mm
β	31.0 - 41.0 deg
B	9.3 - 12.9 mm
γ	- deg
C	- mm

F1

ZEXEL - Test values  
Injection pumps



F2

ZEXEL - Test values  
Injection pumps



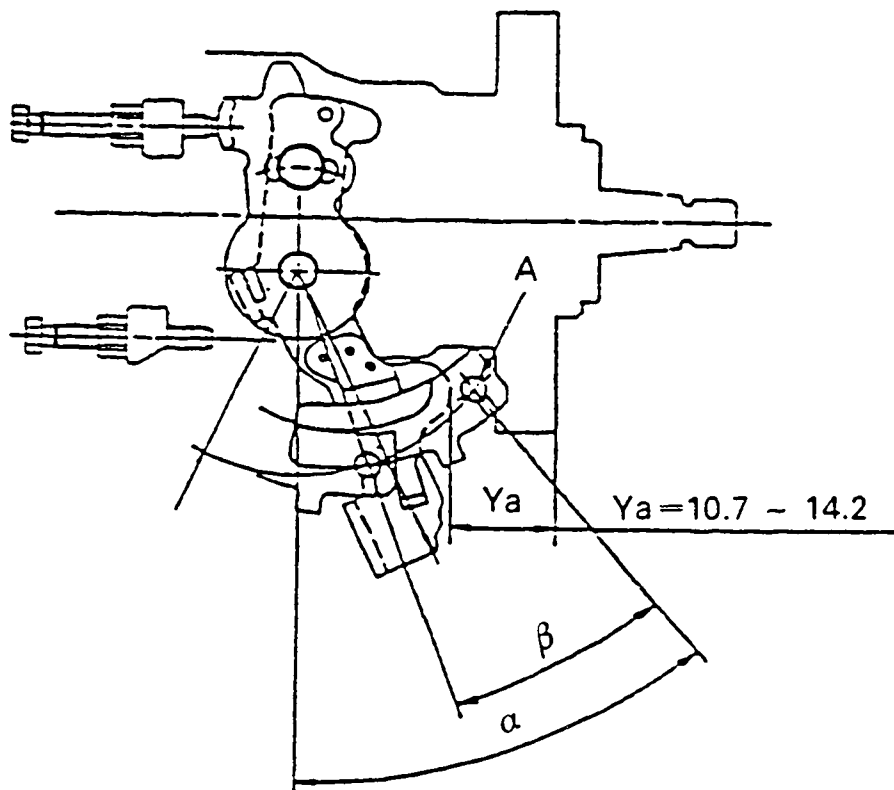


Fig. 25

104740-9811 2/2

**Note**

■ If there is no designation in the specifications for the Solenoid Timer's ON - OFF position, then the position should be regarded as OFF.

■ Control lever angle measurement position

- 1) Measure the control lever angles ( $\alpha$ ,  $\beta$ ,  $\gamma$ ) at hole A.

**F3**

ZEXEL - Test values

Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model:4JB1-BG

1/2

BOSCH No.	9 460 610 407
ZEXEL No.	104741-1761
Date:	25.6.1990 [1]
Company:	ISUZU
No.	8944710501

Injection pump no.: 104641-1761 (NP-VE4/11F1900LNP651)

Pump rotation: Counter clockwise-viewed from drive side  
Test-nozzle holder combination: 1 688 901 000  
Test pressure line: 1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Time device travel	1450	1.7 - 2.1 (mm)		
1-2 Supply pump pressure	1450	5.0 - 5.4 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge air pre	1000	44.1 - 45.1 (cc/1000st)		3.5
1-4 Idle speed regulation	390	6.0 - 10.0 (cc/1000st)		2.0
1-5 Start	100	75.0 -115.0 (cc/1000st)		
1-6 Full-load speed regulation	2100	17.2 - 23.2 (cc/1000st)		6.0
1-7 ACS adjustment	1000	Decrease 3.6 - 6.2 (cc/1000st)	-164 ± 5	

2. Test values

2-1 Timing device	Solenoid timer	ON	OFF	
	N = rpm mm	460-660 0.5	1220-1320 0.5	1450 1.6-2.2 1950 5.3-6.1
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	1000 3.0-3.6	1450 5.0-5.4	1950 6.5-7.1
2-3 Overflow delivery	N = rpm cc/10s	1450 63.0-107.0		
2-4 Fuel delivery quantities				
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)
End stop	1000	43.6 - 45.6		
	500	41.2 - 49.2		
	700	38.1 - 43.1		
	1450	44.7 - 49.7		
	1800	42.3 - 48.3		
	2000	32.3 - 41.3		
	2100	16.7 - 23.7		
	2300	below 5.0		
Switch off	390	0		
Idle-stop	390	6.0 - 10.0		
	550	below 3.0		
ACS adjustment	1000	Decrease 2.9-6.9	-164 ± 5	
2-5 Solenoid	Cut-in voltage max.: 8 V Test voltage: 12 - 14 V			

3. Dimensions	
K	2.7 - 2.9 mm
KF	4.9 - 5.1 mm
MS	0.9 - 1.1 mm
BCS	- mm
Prestr.	0.43 - 0.47 mm
Control lever angle	
α	14.0 - 22.0 deg
A	2.5 - 7.6 mm
β	26.0 - 36.0 deg
B	7.4 - 11.2 mm
γ	- deg
C	- mm

F4

ZEXEL - Test values  
Injection pumps



F5

ZEXEL - Test values  
Injection pumps





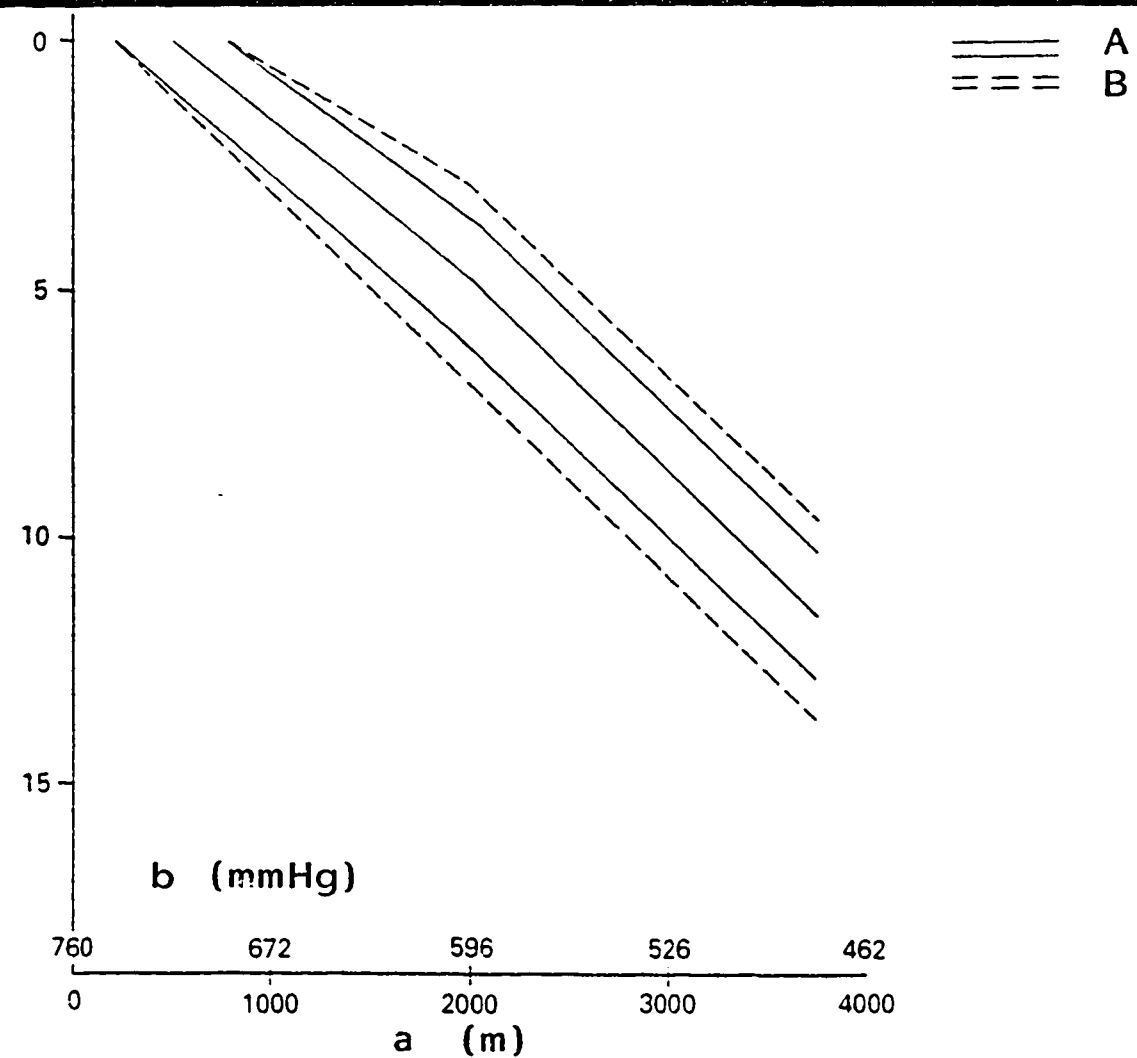


Fig. 26

a = Altitude

b = Atmospheric pressure

c = Injection quantity decrease (cc/1000st)

A = Adjustment value

B = Inspection value

104741-1761 2/2

■ FULL-LOAD FUEL INJECTION QUANTITY AND ACS ADJUSTING PROCEDURE AT HIGH ALTITUDES

1. FULL-LOAD FUEL INJECTION QUANTITY ADJUSTMENT

- 1) Remove the ACS cover, the bellows and the adjusting shims.
- 2) Perform all adjustments as described in the adjusting specifications, except for ACS adjustment.

2. ACS ADJUSTMENT

- 1) Attach the ACS cover, the bellows and the adjusting shims.
- 2) At a pump speed of 1000 rpm and referring to the graph above, use the shims to adjust the fuel injection quantity decrease according to the altitude.

F6

ZEXEL - Test values  
Injection pumps



F7

ZEXEL - Test values  
Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributor pumps  
Engine model:4JB1-TC

1/4

BOSCH No. 9 460 610 306  
ZEXEL No. 104741-6352  
Date: 25.6.1990 [1]  
Company: ISUZU  
No. 8943268703

Injection pump no.: 104641-6352 (NP-VE4/11F1900RNP773)

Pump rotation: clockwise-viewed from drive side  
Test-nozzle holder combination: 1 688 901 000  
Test pressure line: 1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Time device travel	1500	4.9 - 5.3 (mm)	590 - 610	
1-2	Supply pump pressure	1500	4.7 - 5.1 (kg/cm <sup>2</sup> )	590 - 610	
1-3	Full load deliv. without charge air pre	1250	68.1 - 69.1 (cc/1000st)	590 - 610	3.5
	Full load deliv. with charge air press.	800	47.7 - 48.7 (cc/1000st)	295 - 315	4.5
1-4	Idle speed regulation	385	6.1 - 10.1 (cc/1000st)	0	2.0
1-5	Start	100	80.0 - 90.0 (cc/1000st)	0	
1-6	Full-load speed regulation	2300	16.6 - 22.6 (cc/1000st)	590 - 610	4.5

2. Test values

2-1 Timing device	Solenoid timer N = rpm mm	ON	OFF	
		750 above 1.0	1500 4.9-5.3	1700 6.7-7.5
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>		1500 4.7-5.1	1900 5.8-6.4
2-3 Overflow delivery	N = rpm cc/10s	1500 57.0 - 100.0	1500 65 - 108	
2-4 Fuel delivery quantities				
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)
End stop	400	36.5 - 47.5	0	
	600	34.7 - 40.7	130 - 150	
	800	47.2 - 49.2	295 - 315	
	1250	67.6 - 69.6	590 - 610	
	1250	47.6 - 54.6	0	
	1900	66.5 - 75.5	590 - 610	
	2300	16.1 - 23.1	590 - 610	
	2400	below 12	590 - 610	
Switch off	385	0	0	
Idle-stop	385	6.1 - 10.1	0	
	500	below 3.0	0	

3. Dimensions	
K	2.7 - 2.9 mm
KF	5.4 - 5.6 mm
MS	0.9 - 1.1 mm
BCS	3.8 - 4.0 mm
Prestr.	0.73 - 0.77 mm
Control lever angle	
α	20.0 - 28.0 deg
A	- mm
β	43.0 - 53.0 deg
B	- mm
γ	- deg
C	- mm

2-5 Solenoid  
Cut-in voltage max.: 8 V  
Test voltage: 12 - 14 V

**F8**

ZEXEL - Test values  
Injection pumps



**F9**

ZEXEL - Test values  
Injection pumps



■ POTENTIOMETER ADJUSTMENT SPECIFICATIONS

Pump speed (rpm)	Output voltage (V)	Injection quantity mm <sup>3</sup> /st	Remarks
750	2.49±0.03	8.7±1 Boost = 600 mmHg	Adjustment point
385	0.96±0.4	8.1±2 (idle)	Confirmation point

Adjustment (voltage: 10V, dummy bolt method)

1. At a pump speed of 750 rpm and a fuel injection quantity of 8.7±1 mm<sup>3</sup>/st, adjust the dummy bolt so that it contacts the control lever, and then fix it using the locknut.
2. Then, adjust the potentiometer so that the output voltage is 2.49±0.03 v.
3. Following adjustment, remove the dummy bolt and confirm that the potentiometer output voltage is as specified above when the control lever is in the idle position.

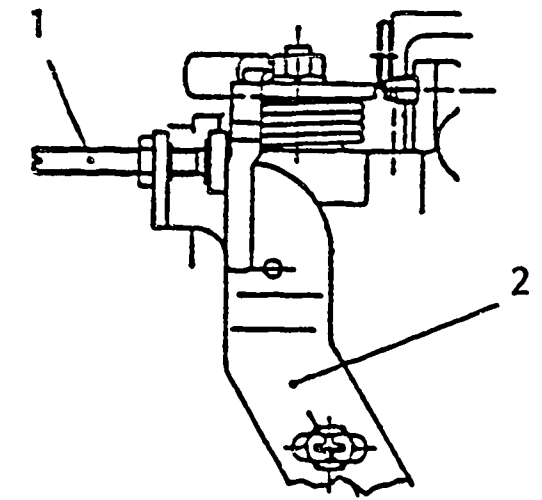


Fig. 27

- 1 = Dummy bolt  
2 = Dummy bolt installation bracket

F10

ZEXEL - Test values  
Injection pumps



F11

ZEXEL - Test values  
Injection pumps



## MICROSWITCH ADJUSTMENT

Injection quantity specifications (Boost pressure = 600 mmHg)		Microswitch adjustment specifications	
Speed (rpm)	Injection quantity (mm <sup>3</sup> /st)	Microswitch operation	Potentiometer output (V)
1000	29.1 ± 3.5	ON → OFF	3.89 ± 0.05

1. Fix the dummy bolt used to adjust the potentiometer so that potentiometer output voltage is 3.89 V.
2. Move the microswitch in the direction of the arrow from the ON position of the OFF position, and fix it in this position.
3. Loosen the dummy bolt and confirm that potentiometer output voltage is 3.89 ± 0.05 when the microswitch moves from ON to OFF.
4. Following adjustment, remove the dummy bolt's fixing bracket.

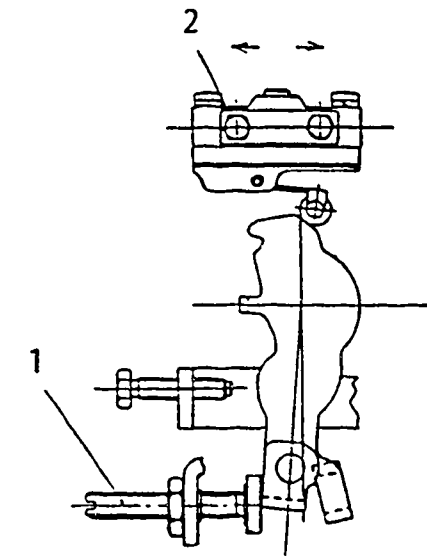


Fig. 28

- 1 = Dummy bolt  
 2 = Microswitch fixing bolt  
 T = 0.2 - 0.3 kgm

F12

ZEXEL - Test values  
 Injection pumps



F13

ZEXEL - Test values  
 Injection pumps



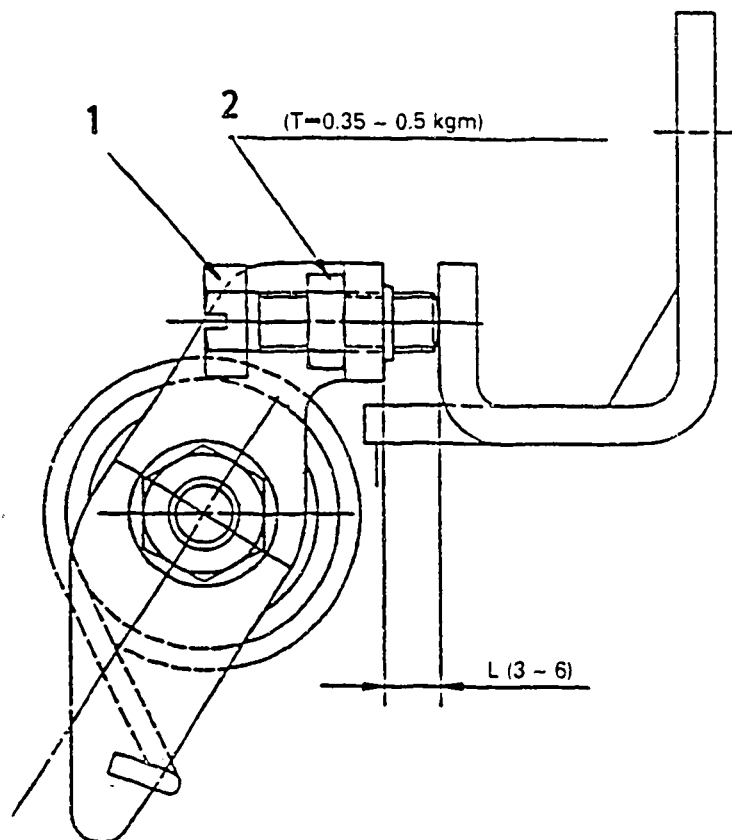


Fig. 29

104741-6352 4/4

- 1 = Bolt
- 2 = Nut

■ V-FICD ADJUSTMENT

1. Adjust the bracket so that the clearance  $S$  is  $1^{+1}$  mm.
2. Apply 400 mmHg negative pressure to the inside of the actuator and confirm that the actuator shaft moves the full stroke.

■ STARTING INJECTION QUANTITY ADJUSTMENT

**F14**

ZEXEL - Test values

Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

ZEXEL-TEST VALUES  
Distributor pumps  
Engine model: 4JB1

1/2

BOSCH No. 9 460 610 375  
ZEXEL No. 104741-6541  
Date: 25.6.1990 [1]  
Company: ISUZU  
No. 8943738550

Injection pump no : 104641-6540

(NP-VE4/11F1800RNP833)

Pump rotation: clockwise-viewed from  
drive side

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Test values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1500	4.1 - 4.5 (mm)		
1-2 Supply pump pressure	1500	4.4 - 4.8 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge air pre	1000	45.2 - 46.2 (cc/1000st)		3.5
Full load deliv. with charge air press.		(cc/1000st)		
1-4 Idle speed regulation	385	9.4 - 13.4 (cc/1000st)		2.0
1-5 Start	100	60.0 - 100.0(cc/1000st)		
1-6 Full-load speed regulation	2100	18.4 - 24.4 (cc/1000st)		4.0

2. Test values

2-1 Timing device	Solenoid timer N = rpm mm	ON	OFF			
		800 above 0.5	1250 0.5-1.3	1500 4.0-4.6	1700 6.2-7.4	1900 7.4-8.2
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>			1500 4.4-4.8	1700 5.0-5.6	1900 5.7-6.3
2-3 Overflow delivery	N = rpm cc/10s	1500 45.0-98.0		1500 45.0-98.0		

2-4 Fuel injection quantities

Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)
End stop	650	(30.4 - 38.4)		
	1000	44.7 - 46.7		
	1800	(50.7 - 58.7)		
	2100	17.9 - 24.9		
	2200	below 5.0		

Switch off	385	0		
Idle	550	below 5.0		
stop	385	9.4 - 13.4		

2-5 Solenoid	Cut-in voltage max.: 8 V Test voltage: 12 - 14 V			
--------------	---	--	--	--

3. Dimensions

K	2.7 - 2.9 mm
KF	4.9 - 5.1 mm
MS	0.9 - 1.1 mm
BCS	- mm
Prestr.	0.43 - 0.47 mm
Control lever angle	
α	14.0 - 22.0 deg
A	2.5 - 7.6 mm
β	26.0 - 36.0 deg
B	7.4 - 11.2 mm
γ	- deg
C	- mm

F15

ZEXEL - Test values  
Injection pumps



F16

ZEXEL - Test values  
Injection pumps



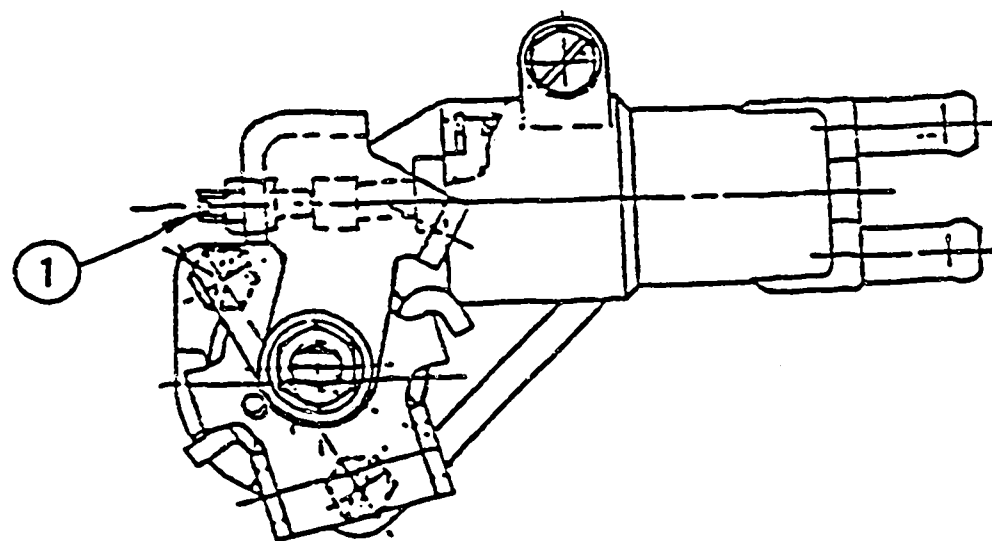


Fig. 30  
1 = Screw

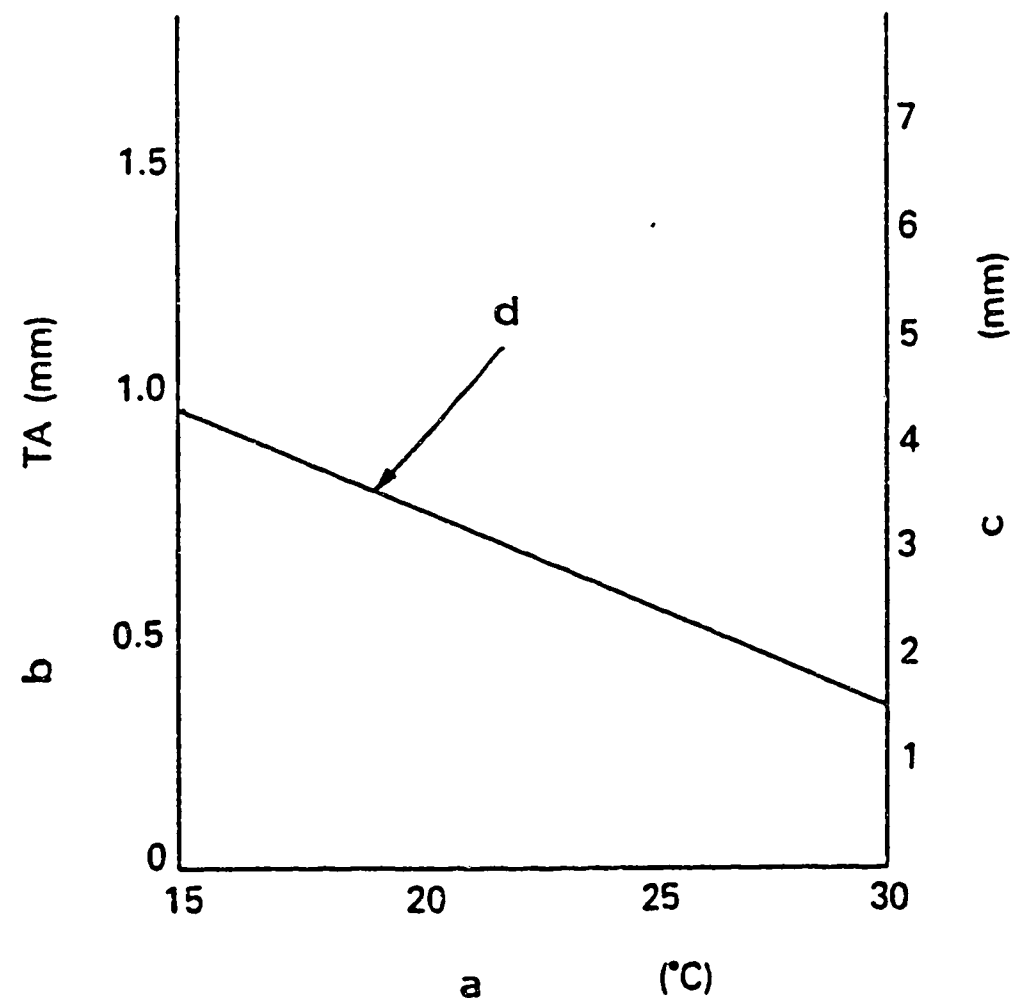


Fig. 31

a = Temperature T  
 b = Timer stroke  
 c = Control lever angle (deg/mm)  
 d = Timer stroke (mm):  $TA = -0.0437 t + 1.59$

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment

- 1) Calculate the timer stroke from Fig. 31 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 31.



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model: CD17

1/5

BOSCH No.	9 460 610 273
ZEXEL No.	104748-2180
Date:	25.6.1990
Company:	NISSAN
No.	16700 17A01

Injection pump no. 104648-2100 (NP-VE4/8F2500LNP177)

Pump rotation: Counter clockwise-viewed from drive side  
Test-nozzle holder combination: 1 688 901 000  
Test pressure line: 1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1200	2.3 - 2.9 (mm)		
1-2 Supply pump pressure	1200	3.1 - 3.7 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	1200	28.6 - 29.6 (cc/1000st) (cc/1000st)		2.5
1-4 Idle speed regulation	400	5.3 - 8.3 (cc/1000st)		3.0
1-5 Start	100	45.3 - 55.3 (cc/1000st)		
1-6 Full-load speed regulation	2700	11.9 - 17.9 (cc/1000st)		
1-7 Load-timer adjustment				
1-8				

2. Test values

2-1 Timing device	N = rpm mm	1200 2.2 - 3.0	1800 4.3 - 5.5	2500 7.4 - 8.6
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	1200 3.0 - 3.8	1800 4.4 - 5.2	2500 6.1 - 6.9
2-3 Overflow delivery	N = rpm cc/10s	1200 36.0 - 80.0		
2-4 Fuel injection quantities				
Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres(mmHg)	Difference (cc)
End stop	600 1200 1200 2500 2700 2900	24.3 - 28.3 decrease 1.1-4.1 28.1 - 30.1 25.7 - 29.7 11.4 - 18.4 below 6.0	-140 ± 5	
Switch off	400	0		
Idle	400	4.8 - 8.8		
stop	600	below 3.0		
Partial load	700	10.0 - 20.0		
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V			

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.1 - 1.9 mm
BCS	- mm
Pre-str.	- mm
Control lever angle	
α	20.0 - 28.0 deg
A	3.2 - 8.3 mm
β	39.0 - 49.0 deg
B	11.5 - 15.5 mm
γ	11.3° - 14.5° deg
C	8.7 - 9.3 mm

**F19**

ZEXEL - Test values  
Injection pumps



**F20**

ZEXEL - Test values  
Injection pumps





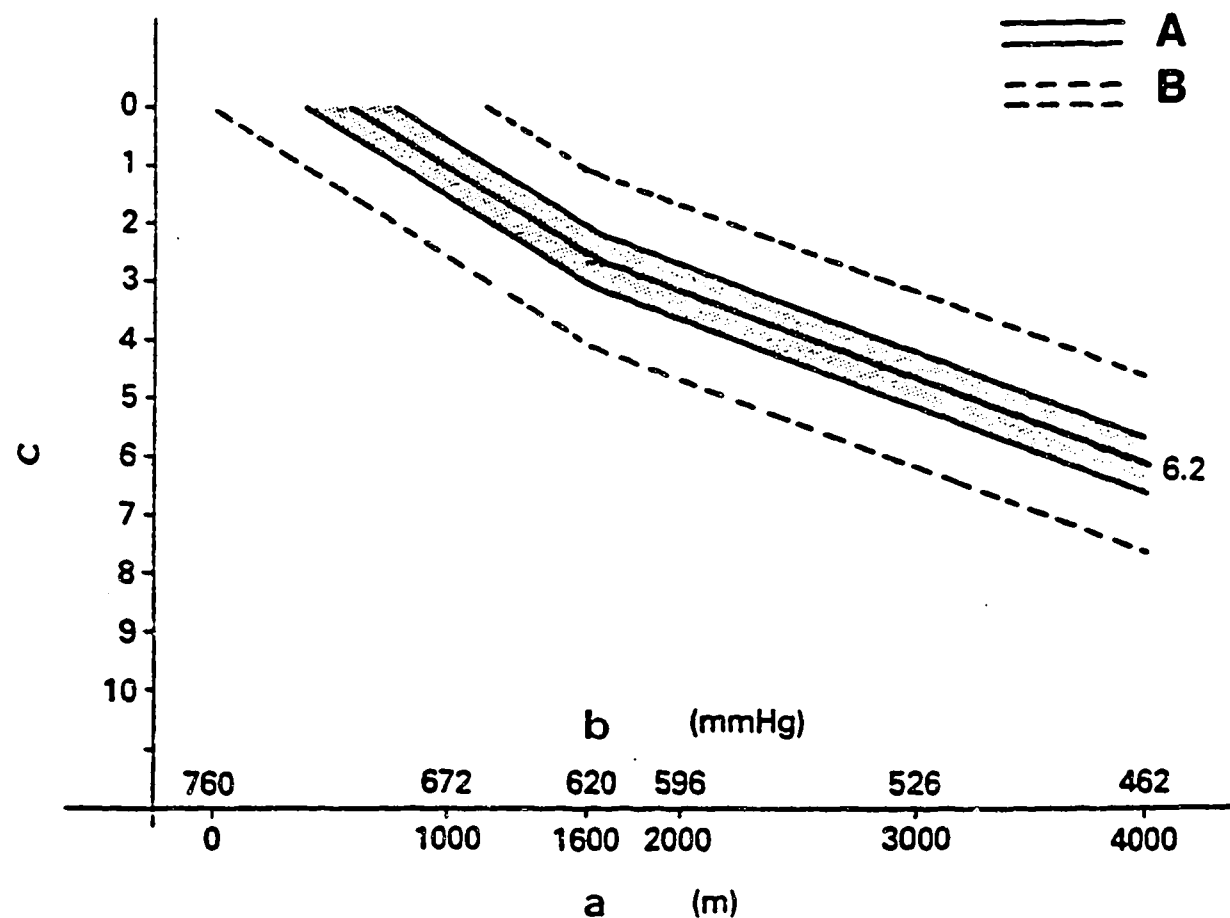


Fig. 32

a = Altitude

b = Atmospheric pressure

c = Injection quantity decrease (cc/1000st)

A = Adjustment value

B = Inspection value

104748-2180 2/5

■ FULL-LOAD FUEL INJECTION QUANTITY AND ACS ADJUSTING PROCEDURE AT HIGH ALTITUDES

1. FULL-LOAD FUEL INJECTION QUANTITY ADJUSTMENT

1) Remove the ACS cover, the bellows and the adjusting shims.

2) Perform all adjustments as described in the adjusting specifications, except for ACS adjustment.

2. ACS ADJUSTMENT

1) Attach the ACS cover, the bellows and the adjusting shims.

2) At a pump speed of 1200 rpm and referring to the graph above, use the shims to adjust the fuel injection quantity decrease according to the altitude.

F21

ZEXEL - Test values

Injection pumps



F22

ZEXEL - Test values

Injection pumps



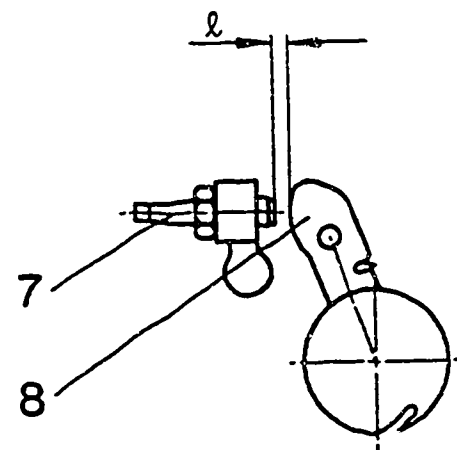


Fig. 33

7 = Idling adjusting bolt  
8 = Control lever

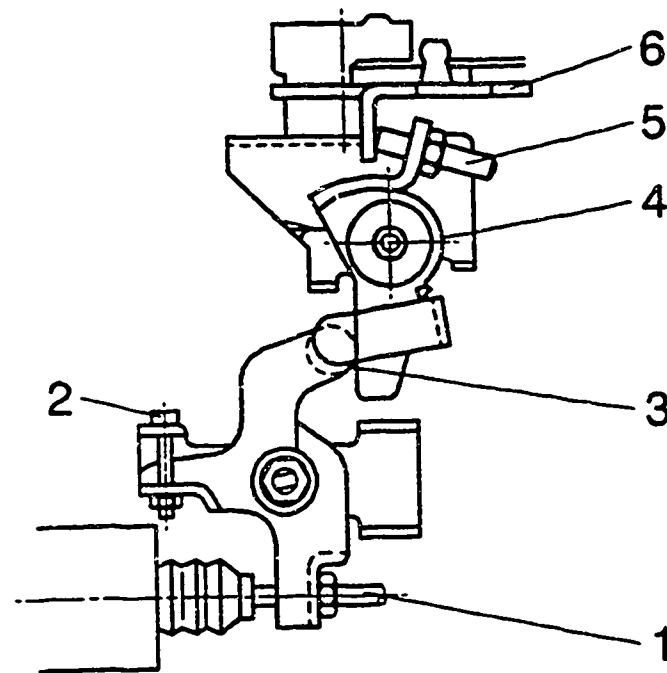


Fig. 34

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment (Fig. 34)

- 1) Calculate the timer stroke from Fig. 35 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 35).

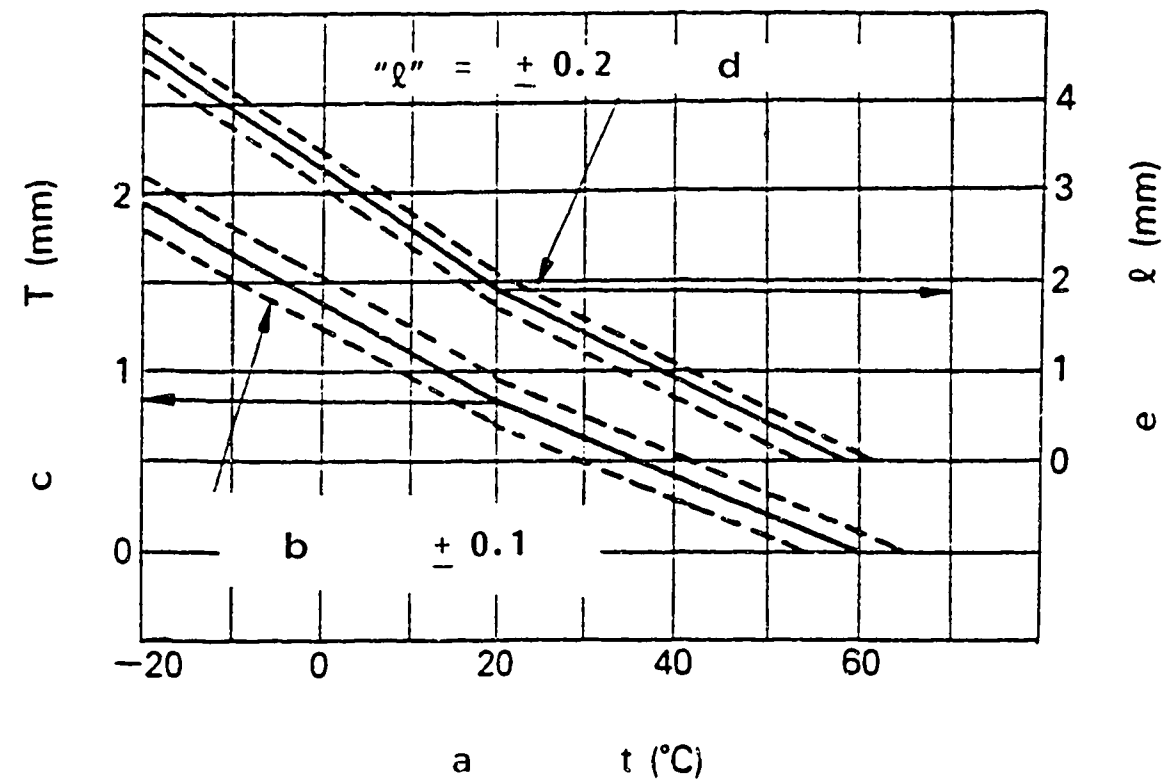


Fig. 35

a = Atmospheric temperature  
b = Tolerance of timer lift  
c = Timer stroke  
d = Tolerance of size  
e = Gap between control lever and idling stopper bolt



Formula for calculating (Fig. 35)

Formula for calculating timer stroke:

$$\begin{array}{ll} -10 \leq t \leq 20 & T = -0.0284 t + 1.367 \\ 20 \leq t \leq 60 & T = -0.02 t + 1.2 \end{array}$$

Formula for calculating control lever  
and idling stopper bolt gap:

$$\begin{array}{ll} -10 < t \leq 20 & l = -0.0667 t + 3.23 \\ 20 < t \leq 60 & l = -0.05 t + 2.9 \end{array}$$

## 2. Adjustment of intermediate lever position (see Figs. 33 and 34)

104748-2180 4/5

Insert a thickness gauge  $l = 1.0 \pm 0.05$  mm between the idling adjusting bolt (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is aligned with the top edge of the bracket (8), screw in the intermediate lever screw (5) so that it touches the intermediate lever (6).

Next, turn this screw a half to a full rotation clockwise. Turn it back to its previous position, and then tighten. (During this process, the intermediate lever moves in the horizontal plane by  $1^\circ$  to  $3^\circ$  clockwise.)

## 3. Adjustment of CSD lever (see Figs. 33 and 34)

Insert the thickness gauge  $l = \pm 0.05$  mm, as shown in the diagram (Fig. 35), between the idling adjusting bolt (7) and the control lever (6), and tighten the idling stopper bolt (2) at the point where the roller of the CSD lever (3) touches the intermediate lever (4).

(The temperature of the wax should be below  $30^\circ\text{C}$  during adjustment.)

### Note :

When inserting the thickness gauge between levers (3) and (4), use the idling stopper bolt (2) to create a gap between them so that they are not subject to excessive force.

### ■ ADJUSTMENT OF STARTING INJECTION QUANTITY

Adjust the starting injection quantity (item 1-5) using the adjusting bolt.

### ■ POTENTIOMETER

At a speed of 1100 rpm, an oil temperature of  $48$  to  $52^\circ\text{C}$  and the control lever positioned  $14^\circ$  ( $6.9$  mm) from idling, set the potentiometer in such a way that the values specified in Figs. 36, 37 and 38 are obtained.

F25

ZEXEL - Test values  
Injection pumps



F26

ZEXEL - Test values  
Injection pumps



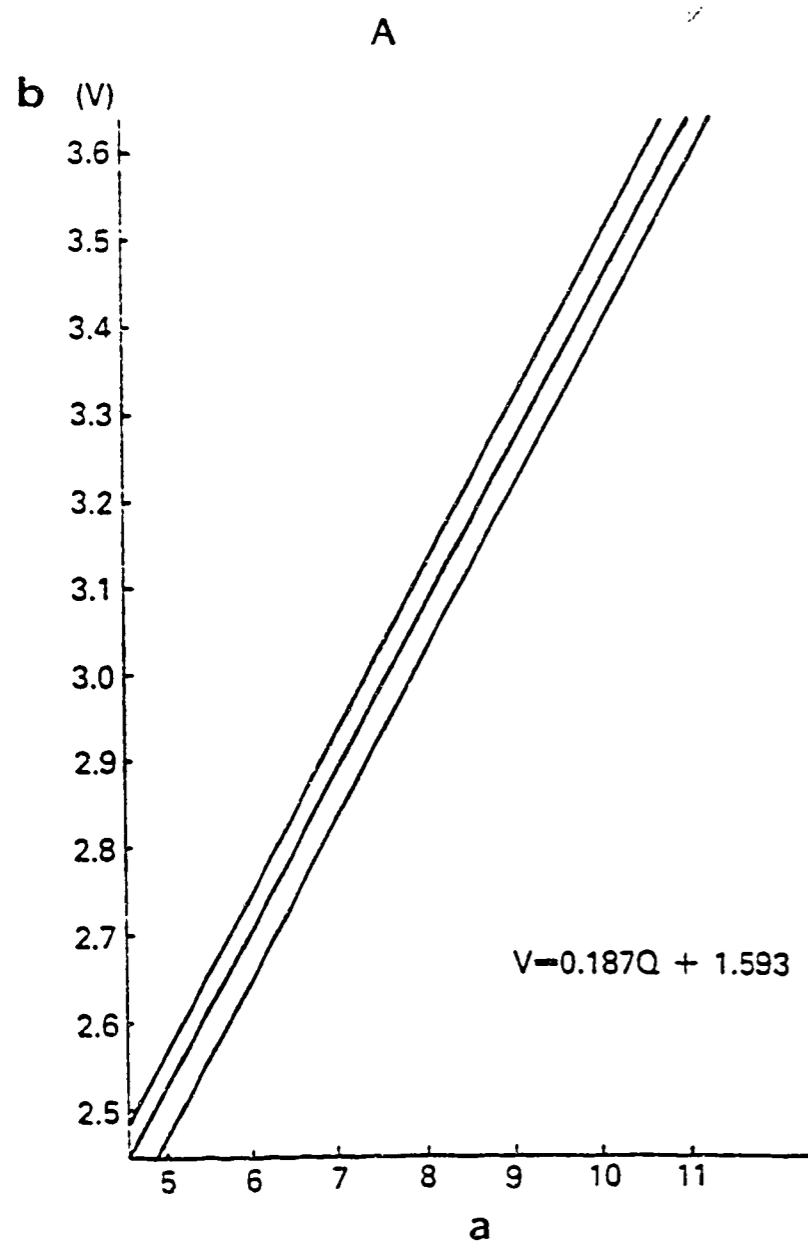


Fig. 36

A = Potentiometer adjusting value (I)

a = Fuel quality (cc/1000st)

b = Voltage



Fig. 37

B = Potentiometer adjusting value (II)

a = Fuel quality (cc/1000st)

b = Voltage

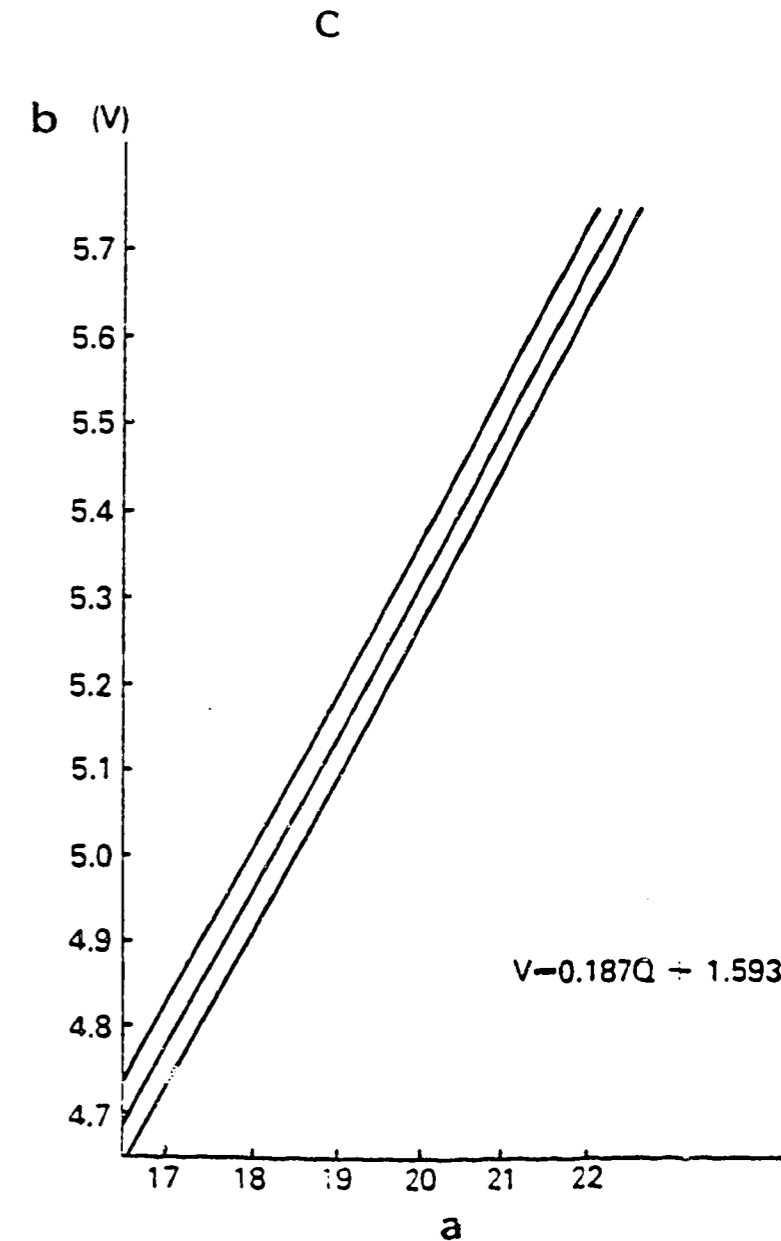


Fig. 38

C = Potentiometer adjusting value (III)

a = Fuel quality (cc/1000st)

b = Voltage



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model: CD17

1/4

BOSCH No.	9 460 610 437
ZEXEL No.	104748-2640
Date:	25.6.1990 [0]
Company:	NISSAN
No.	16700 54A11

Injection pump no. 104648-2630 (NP-VE4/8F2500LNP715)

Pump rotation: Counter clockwise-viewed from drive side  
Test-nozzle holder combination: 1 688 901 000  
Test pressure line: 1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1200	1.5 - 2.1 (mm)		2.5
1-2 Supply pump pressure	1200	3.1 - 3.7 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	1000	27.1 - 28.1 (cc/1000st) (cc/1000st)		
1-4 Idle speed regulation	360	3.7 - 6.7 (cc/1000st)		
1-5 Start	100	50.3 - 70.3 (cc/1000st)		
1-6 Full-load speed regulation	2700	11.8 - 17.8 (cc/1000st)		
1-7 Load-timer adjustment				
1-8				

2. Test values

2-1 Timing device	N = rpm mm	1200 1.4 - 2.2	1800 3.5 - 4.7	2500 6.9 - 7.8
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	1200 3.0 - 3.8	1800 4.4 - 5.2	2500 6.1 - 6.9
2-3 Overflow delivery	N = rpm cc/10s	1200 36.0 - 80.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	1000	26.6 - 28.6		2.5
	600	24.8 - 28.8		
	2500	24.3 - 28.3		
	2700	11.3 - 18.3		
	2900	below 6.0		
Switch off	360	0		
Idle stop	360	3.2 - 7.2		
	600	below 3.0		
Partial load	700	10.8 - 19.8		

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
BCS	- mm
Pre-str.	- mm

Control lever angle

α	1.0 - -1.0 deg
YA	15.4 - 18.1 mm
β	39.0 - 49.0°deg
B	11.0 - 16.0 mm
γ	13.5° - 14.5°deg
C	8.6 - 9.2 mm

G1

ZEXEL - Test values  
Injection pumps



G2

ZEXEL - Test values  
Injection pumps



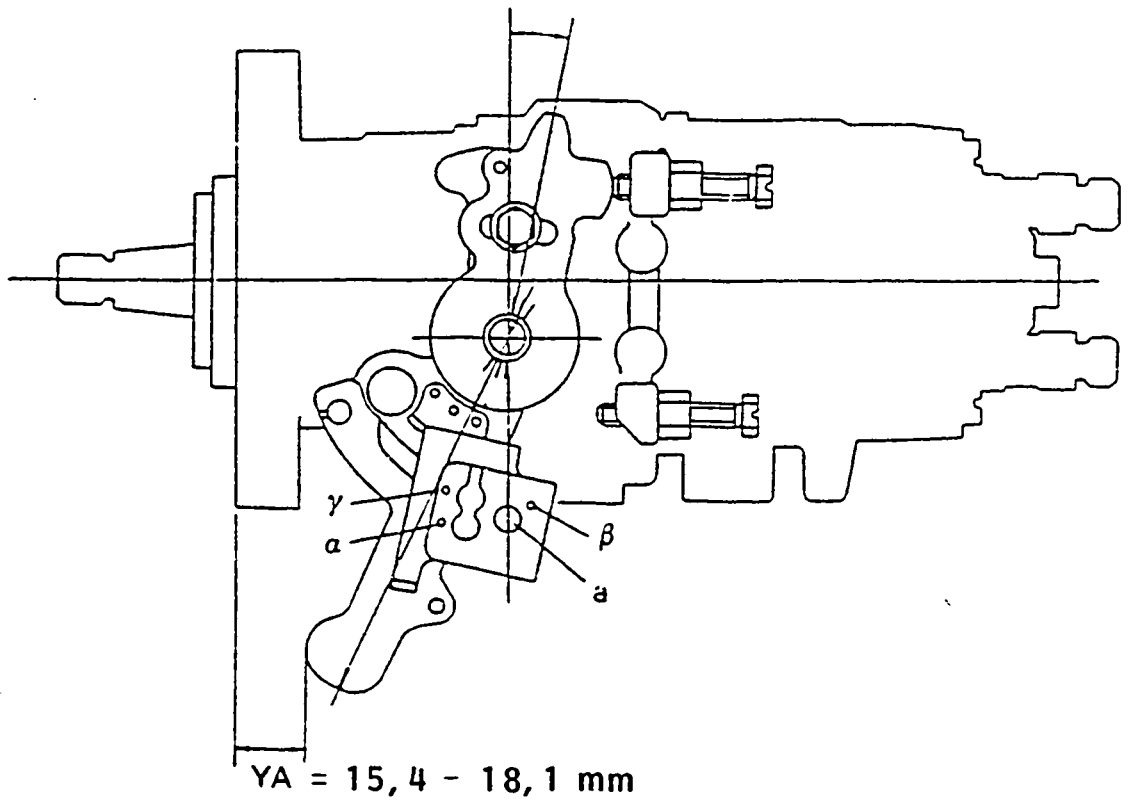


Fig. 39

104748-2640 2/4

Control lever angle measurement position

a = Measurement position

**G3**

ZEXEL - Test values

Injection pumps



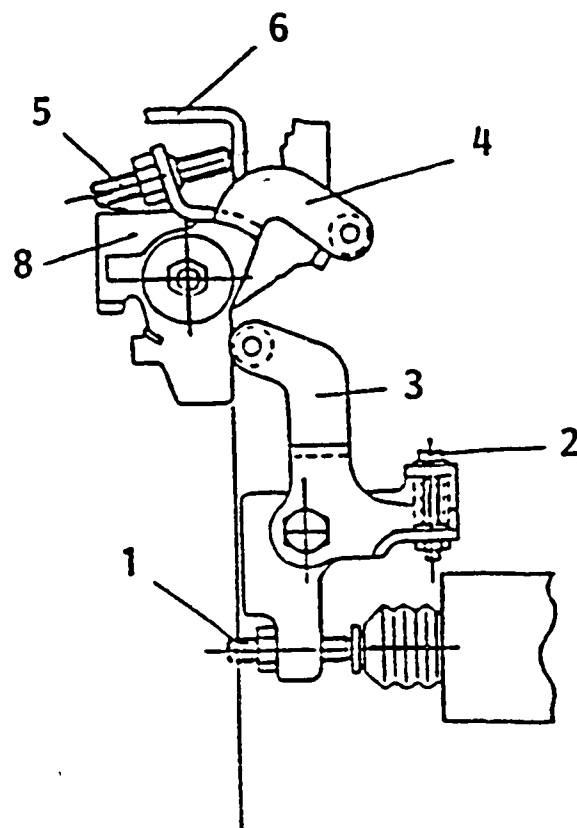


Fig. 40

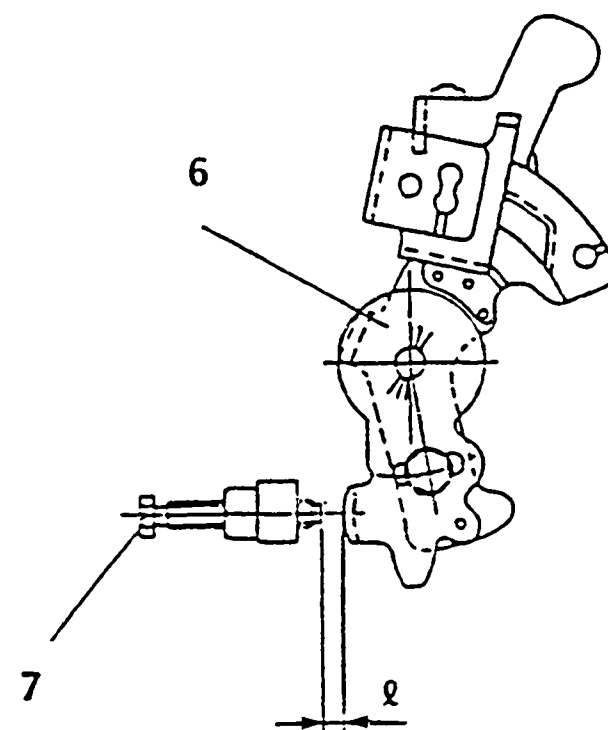


Fig. 41

$l$  = Block gauge

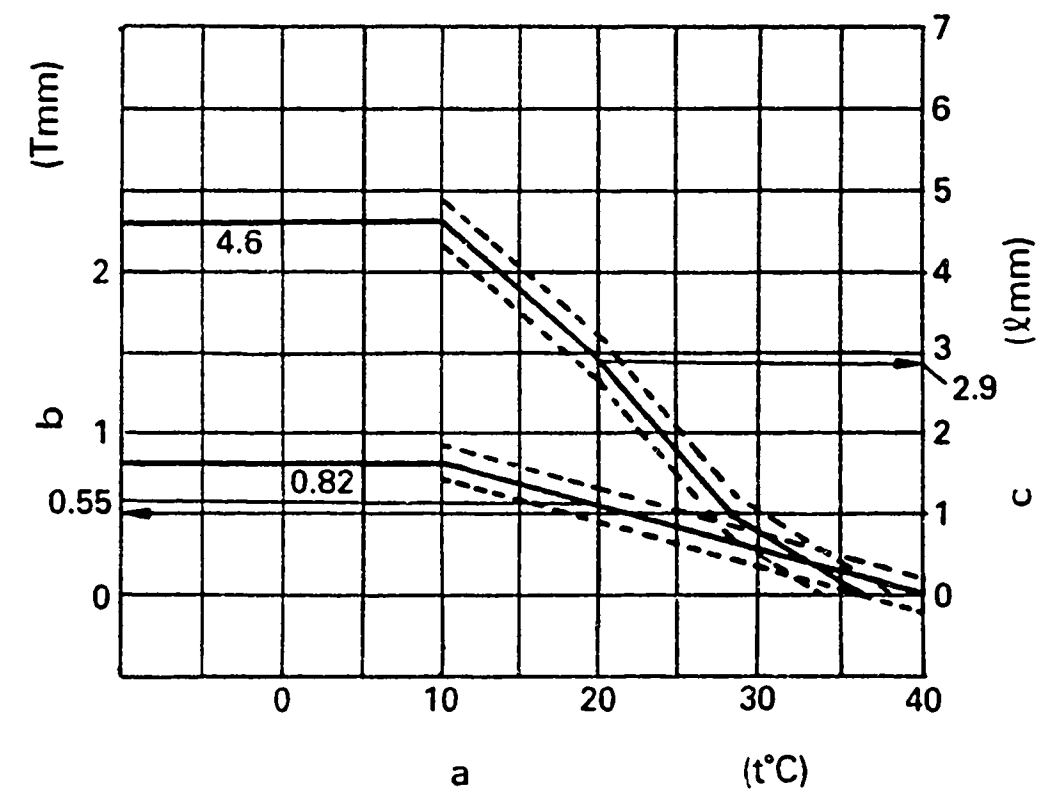


Fig. 42

104748-2640 3/4

a = Atmospheric temperature  
 b = Timer stroke  
 c = Gap between control lever and idling stopper bolt

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment (Fig. 40)

Calculate the timer stroke from Fig. 42 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 42.

G4

ZEXEL - Test values  
 Injection pumps



G5

ZEXEL - Test values  
 Injection pumps



Formula for calculating (Fig. 42)

Formula for calculating timer stroke:

$$\begin{array}{ll} 10 \leq t \leq 20 & T = -0.027 t + 1.09 \\ 20 \leq t \leq 40 & T = -0.0275 t + 1.1 \end{array}$$

Formula for calculating control lever  
and idling stopper bolt gap:

$$\begin{array}{ll} t \leq 10 & l = 4.6 \\ 10 < t \leq 20 & l = -0.17 t + 6.3 \\ 20 < t \leq 28.5 & l = -0.235 t + 7.6 \\ 28.5 < t \leq 36 & l = -0.12 t + 4.32 \end{array}$$

104748-2640 4/4

2. Adjustment of intermediate lever position (see Figs. 40 and 41)

Insert a thickness gauge  $l = 4.1 \pm 0.05$  mm between the idling adjusting bolt (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is aligned with the top edge of the bracket (8), screw in the intermediate lever screw (5) so that it touches the intermediate lever (6).  
Next, turn this screw a half to a full rotation clockwise. Turn it back to its previous position, and then tighten.  
(During this process, the intermediate lever moves in the horizontal plane by  $1^\circ$  to  $3^\circ$  clockwise.)

3. Adjustment of CSD lever (see Figs. 40 and 41)

Insert the thickness gauge  $l = \pm 0.05$  mm, as shown in the diagram (Fig. 42), between the idling adjusting bolt (7) and the control lever (6), and tighten the idling stopper bolt (2) at the point where the roller of the CSD lever (3) touches the intermediate lever (4).  
(The temperature of the wax should be below  $30^\circ\text{C}$  during adjustment.)

**Note :**

When inserting the thickness gauge between levers (3) and (4), use the idling stopper bolt (2) to create a gap between them so that they are not subject to excessive force.

G6

ZEXEL - Test values  
Injection pumps



G7

ZEXEL - Test values  
Injection pumps





Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model: CD17

1/4

BOSCH No.	9 460 610 369
ZEXEL No.	104748-2700
Date:	25.6.1990 [0]
Company:	NISSAN
No.	16700 54A17

Injection pump no. 104648-2690

(NP-VE4/8F2500LNP374)

Pump rotation: Counter clockwise-viewed from drive side

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1200	1.5 - 2.1 (mm)		2.5
1-2 Supply pump pressure	1200	3.1 - 3.7 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	1000	27.1 - 28.1 (cc/1000st) (cc/1000st)		
1-4 Idle speed regulation	360	3.7 - 6.7 (cc/1000st)		
1-5 Start	100	50.3 - 60.3 (cc/1000st)		
1-6 Full-load speed regulation	2700	11.5 - 17.8 (cc/1000st)		
1-7 Load-timer adjustment				
1-8				

2. Test values

2-1 Timing device	N = rpm mm	1200 1.4 - 2.2	1800 3.5 - 4.7	2500 6.9 - 7.8
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	1200 3.0 - 3.8	1800 4.4 - 5.2	2500 6.1 - 6.9
2-3 Overflow delivery	N = rpm cc/10s	1200 36.0 - 80.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	1000	26.6 - 28.6		
	600	24.8 - 28.8		
	2500	24.3 - 28.3		
	2700	11.3 - 18.3		
	2900	below 6.0		
Switch off	360	0		
Idle stop	360	3.2 - 7.2		2.5
	600	below 3.0		
Partial load	700	5.1 - 14.1		

2-5 Solenoid  
Cut-in voltage max. 8 V  
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
BCS	- mm
Pre-str.	- mm

Control lever angle

α	1.0 - -1.0 deg
A	15.4 - 18.1 mm
β	39.0 - 49.0°deg
B	11.0 - 16.0 mm
γ	13.5° - 14.5°deg
C	8.6 - 9.2 mm

**G8**

ZEXEL - Test values  
Injection pumps



**G9**

ZEXEL - Test values  
Injection pumps



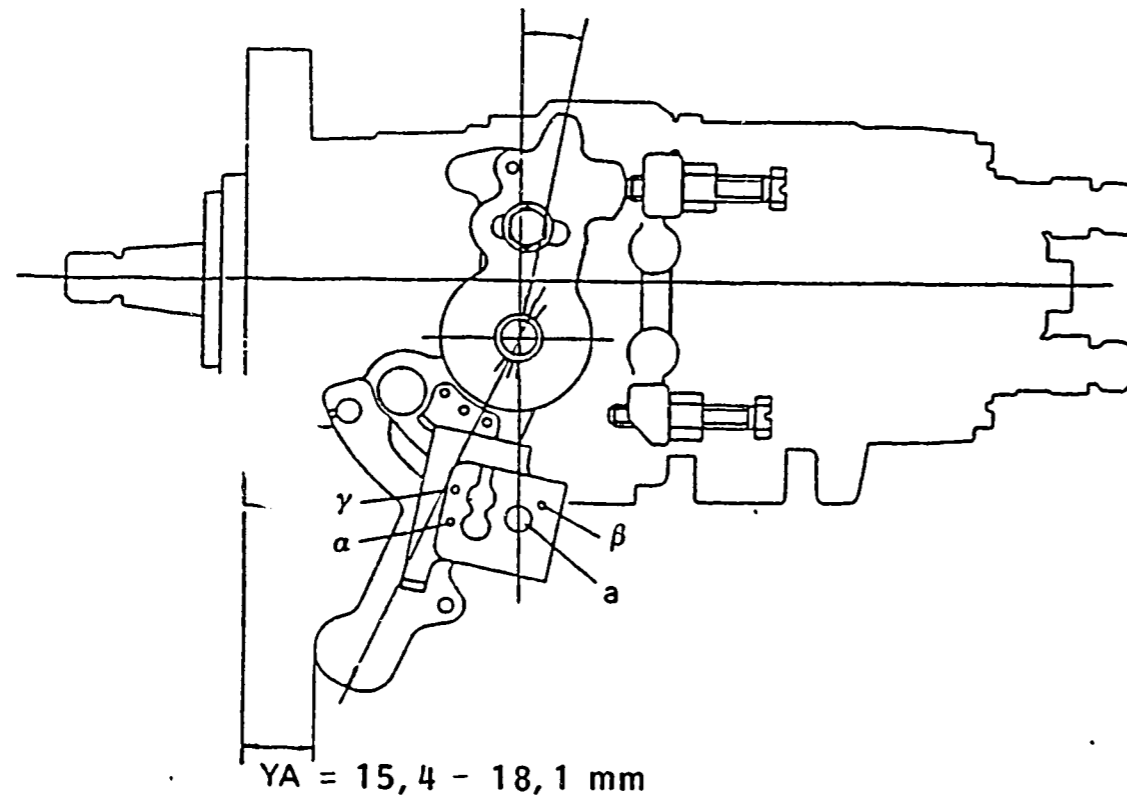


Fig. 43 Control lever angle measurement position

a = Measurement position

■ STARTING INJECTION QUANTITY ADJUSTMENT

Adjust the starting injection quantity (item 1-5) using the adjusting bolt (Fig. 44).

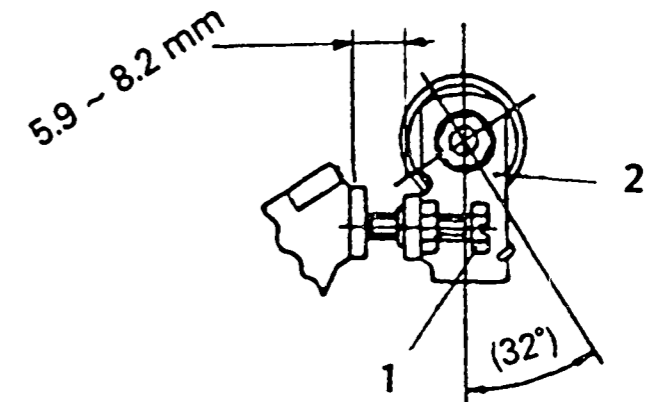


Fig. 44

104748-2700 2/4

1 = Adjusting bolt  
2 = Stop lever



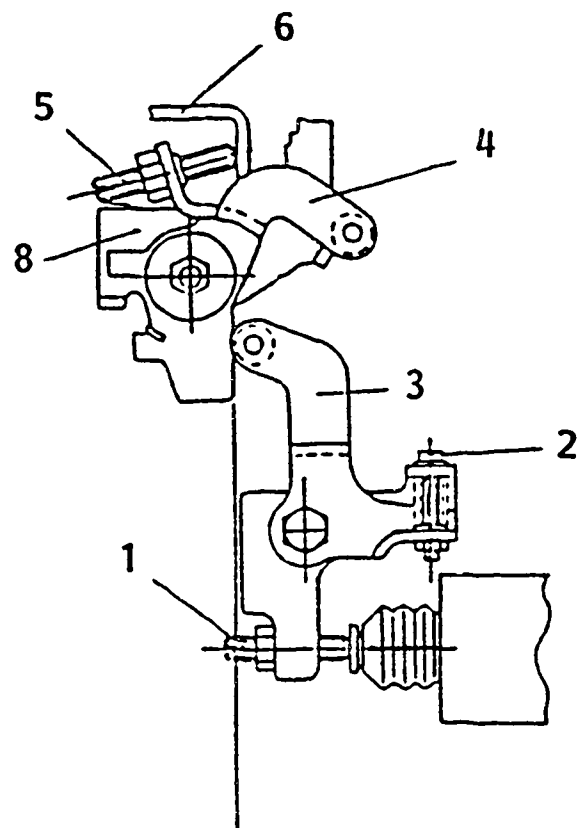


Fig. 45

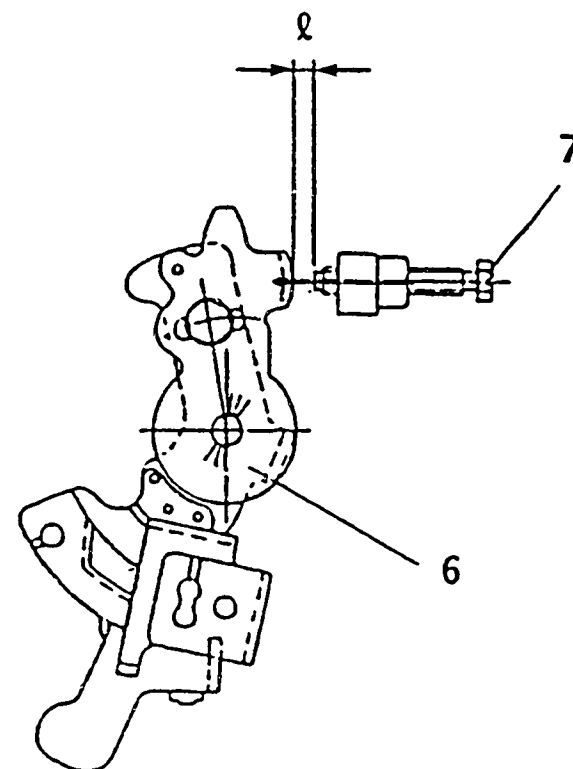


Fig. 46

$l$  = Block gauge

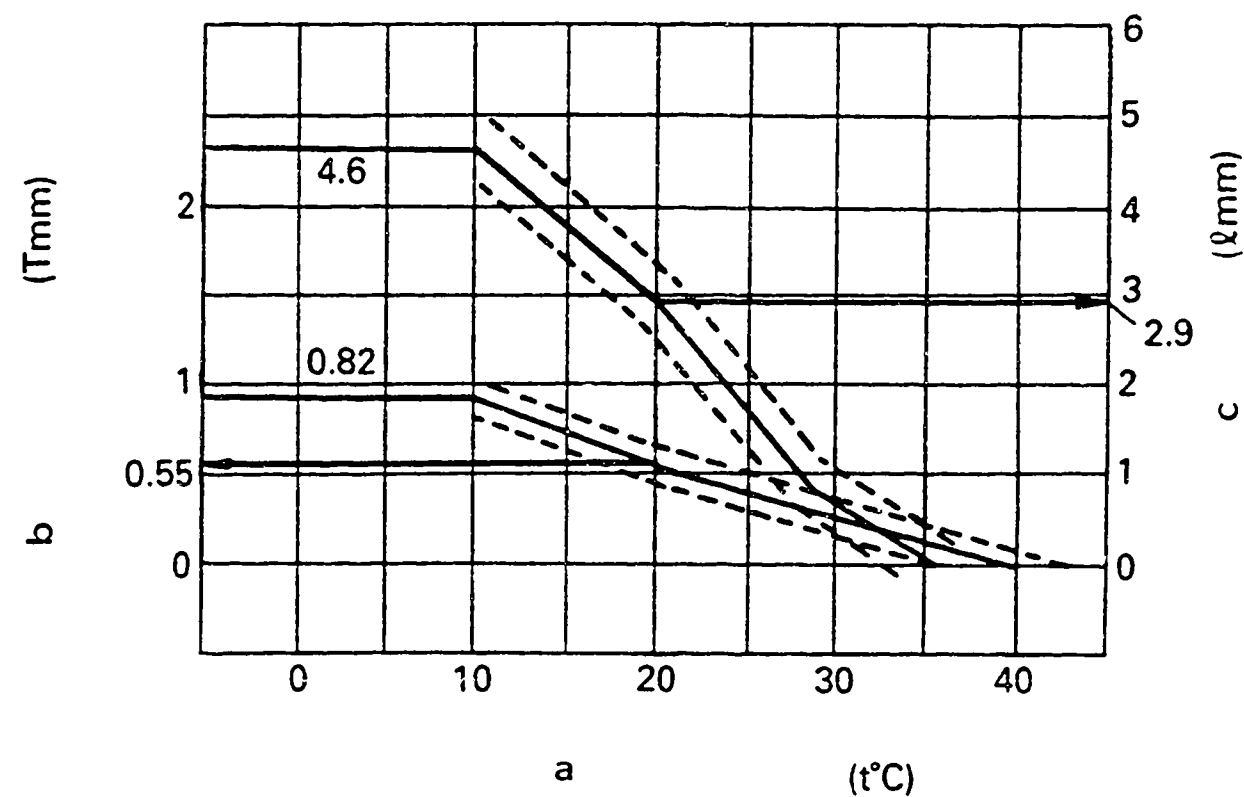


Fig. 47

104748-2700 3/4

a = Atmospheric temperature  
 b = Timer stroke  
 c = Gap between control lever and idling stopper bolt

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment (Fig. 45)

Calculate the timer stroke from Fig. 47 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 47.



Formula for calculating (Fig. 45)

Formula for calculating timer stroke:

$$\begin{array}{ll} 10 \leq t \leq 20 & T = -0.027 t + 1.09 \\ 20 \leq t \leq 40 & T = -0.0275 t + 1.1 \end{array}$$

Formula for calculating control lever  
and idling stopper bolt gap:

$$\begin{array}{ll} t \leq 10 & l = 4.6 \\ 10 < t \leq 20 & l = -0.17 t + 6.3 \\ 20 < t \leq 23.5 & l = -0.235 t + 7.6 \\ 28.5 < t \leq 36 & l = -0.12 t + 4.32 \end{array}$$

104748-2700 4/4

## 2. Adjustment of intermediate lever position (see Figs. 45 and 46)

Insert a thickness gauge  $l = 4.1 \pm 0.05$  mm between the idling adjusting bolt (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is aligned with the top edge of the bracket (8), screw in the intermediate lever screw (5) so that it touches the intermediate lever (6).

Next, turn this screw a half to a full rotation clockwise. Turn it back to its previous position, and then tighten. (During this process, the intermediate lever moves in the horizontal plane by  $1^\circ$  to  $3^\circ$  clockwise.)

## 3. Adjustment of CSD lever (see Figs. 45 and 46)

Insert the thickness gauge  $l = \pm 0.05$  mm, as shown in the diagram (Fig. 47), between the idling adjusting bolt (7) and the control lever (6), and tighten the idling stopper bolt (2) at the point where the roller of the CSD lever (3) touches the intermediate lever (4).

(The temperature of the wax should be below  $30^\circ\text{C}$  during adjustment.)

### Note :

When inserting the thickness gauge between levers (3) and (4), use the idling stopper bolt (2) to create a gap between them so that they are not subject to excessive force.

G14

ZEXEL - Test values  
Injection pumps



G15

ZEXEL - Test values  
Injection pumps



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model: LD20 (XP)

1/4

BOSCH No. 9 460 610 380  
ZEXEL No. 104749-2262  
Date: 25.6.1990 [0]  
Company: NISSAN  
No. 16700 D4600

Injection pump no. 104649-2192 (NP-VE4/9F2500RNP359)

Pump rotation: Clockwise-viewed from drive side  
Test-nozzle holder combination: 1 688 901 000  
Test pressure line: 1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	900	1.3 - 1.7 (mm)		2.5
1-2 Supply pump pressure	900	3.2 - 3.8 (kg/cm <sup>2</sup> )		
1-3 Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	900	30.5 - 31.5 (cc/1000st) (cc/1000st)		
1-4 Idle speed regulation	350	4.7 - 7.7 (cc/1000st)		
1-5 Start	100	40.0 - 60.0 (cc/1000st)		
1-6 Full-load speed regulation	2700	10.9 - 16.9 (cc/1000st)		
1-7 Load-timer adjustment				
1-8				

2. Test values

2-1 Timing device	N = rpm mm	900 1.2 - 1.8	1800 5.5 - 6.7	2300 7.7 - 8.9
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	900 3.1 - 3.9	1800 5.1 - 5.9	2500 6.8 - 7.6
2-3 Overflow delivery	N = rpm cc/10s	900 35.0 - 79.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	600	29.5 - 33.5		
	900	30.0 - 32.0		
	2300	28.9 - 32.9		
	2700	10.4 - 17.4		
	2800	below 6.0		
Switch off	350	0		
Idle stop	350	4.2 - 8.2		2.2
	500	below 4.5		
Partial load	900	4.1 - 14.1		
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V			

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.1 - 1.3 mm
BCS	- mm
Pre-str.	- mm

Control lever angle

$\alpha$	21.0 - 29.0 deg
A	7.6 - 11.7 mm
$\beta$	39.0 - 49.0 deg
B	11.9 - 15.6 mm
$\gamma$	10.5 - 11.5 deg
C	5.5 - 6.1 mm

G16

ZEXEL - Test values  
Injection pumps



G17

ZEXEL - Test values  
Injection pumps



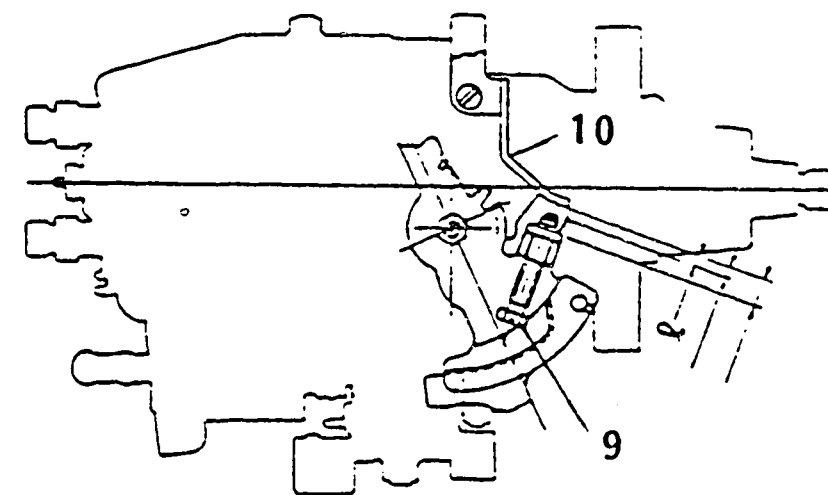
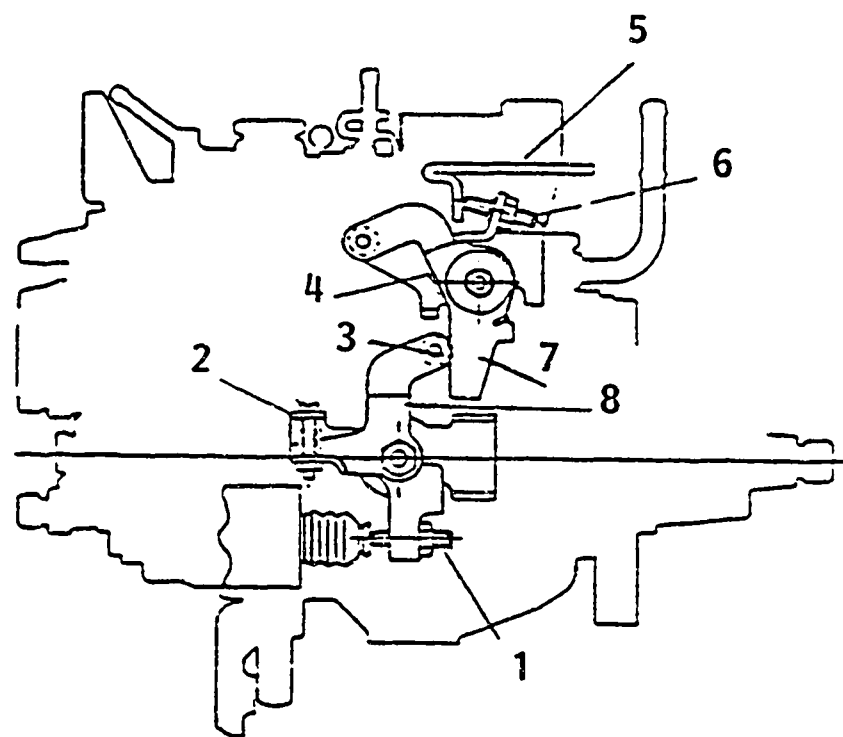


Fig. 48

104749-2262 2/4

- 1 = Timer stroke adjusting screw
- 2 = Idling adjusting bolt
- 3 = Lever roller
- 4 = Aligning mark

- 5 = Control lever
- 6 = Intermediate lever set screw
- 7 = Intermediate lever
- 8 = CSB lever

- 9 = Idling stopper bolt
- 10 = Bracket

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment (adjust to the thick line)

- 1) Calculate the timer stroke from Fig. 49 according to the atmospheric temperature at the time of adjustment.
- 2) Adjust using the timer stroke adjusting screw so that the timer stroke is as calculated.

G18

ZEXEL - Test values  
Injection pumps



G19

ZEXEL - Test values  
Injection pumps



(Continued)

2. Intermediate lever position adjustment

- 1) Insert a block gauge (thickness gauge) of  $0.25 \pm 0.05$  mm thickness between the bracket and the idling stopper bolt.
- 2) Align the intermediate lever with the aligning mark.
- 3) Adjust the intermediate lever set screw to that the control lever and the intermediate lever set screw are in contact, and then fix in position using the locknut.

**G20**

ZEXEL - Test values

Injection pumps



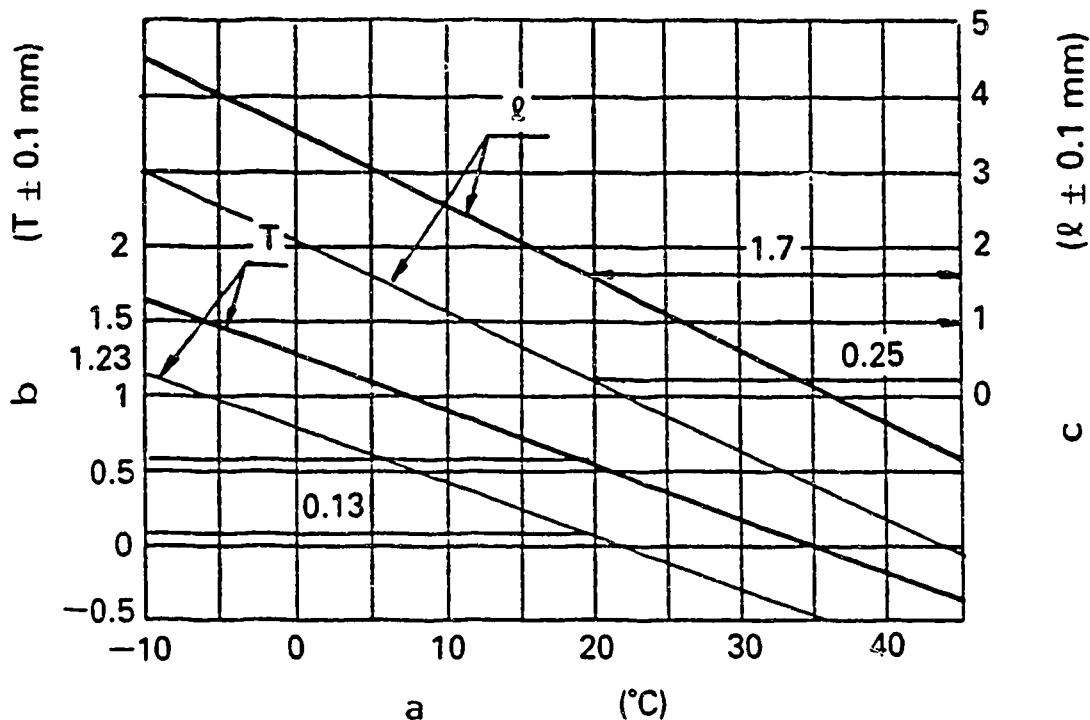


Fig. 49

104749-2262 3/4

a = Atmospheric temperature

b = Timer stroke

c = Gap between control lever  
and idling stopper bolt

Thick line: For temporary adjustment

Thin line: For final adjustment

Formula for calculating timer stroke: (Fig. 49)

$$T = -0.0367 t + 1.424$$

Formula for calculating control lever and idling  
stopper bolt gap:

$$l = -0.095 l + 3.6.$$





(Continued)

3. CSD lever adjustment (adjust to the thick line)

- 1) Calculate the block gauge dimension  $l \pm 0.05$  mm from (Fig. 49) according to the atmospheric temperature at the time of adjustment.
- 2) Insert the block gauge (thickness gauge) selected in (Fig. 49) between the bracket and the idling stopper bolt.
- 3) Using the idling bolt, adjust so that the CSD lever roller and the intermediate lever are in contact.

4. Final adjustment

After completing the adjustment, screw the timer stroke adjusting screw two turns clockwise. (Move from the temporary adjustment chart to the final adjustment chart).

- \* This W-CSD's timer stroke operations are effective at atmospheric temperatures of 27°C or above.

Therefore, to make adjustment at normal temperatures possible, after adjusting to the substitute characteristics, tighten the timer stroke adjusting screw two turns.

**G22**

ZEXEL - Test values

Injection pumps



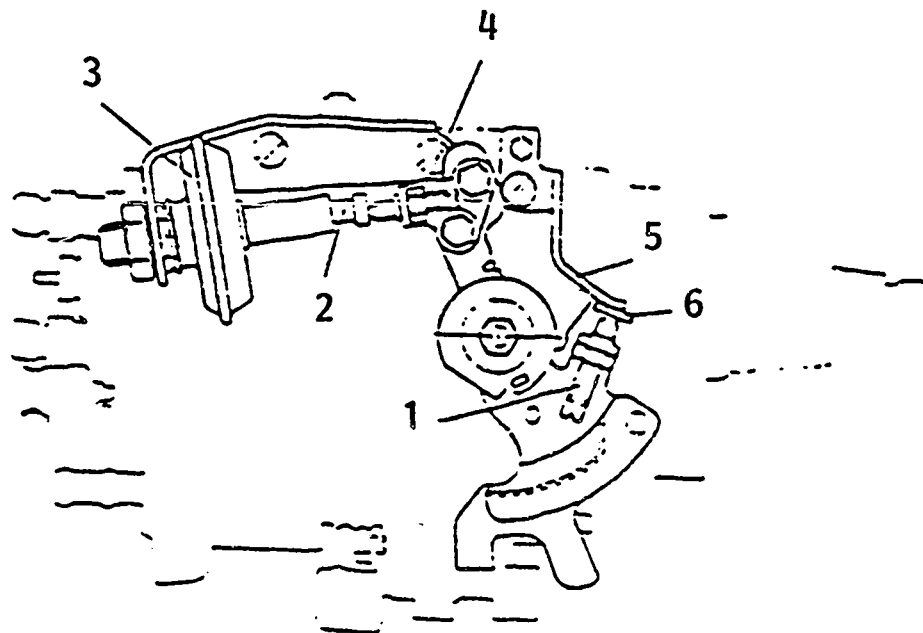


Fig. 50

104749-2262 4/4

- 1 = Idling stopper bolt
- 2 = Push rod
- 3 = Dashpot
- 4 = Dashpot adjusting screw
- 5 = Bracket
- 6 = Block gauge

■ DASH POT ADJUSTMENT

1. Insert a block gauge (thickness gauge) of thickness  $3.8 \pm 0.05$  mm in the gap between the idling stopper bolt and the bracket.
2. With the control lever positioned as described in 1. above, adjust the dashpot adjusting screw so that the dashpot adjusting screw and the push rod are in contact.  
Fix the screw using the nut.



Test oil:  
ISO 4113 od  
SAE J967d

**ZEXEL-TEST VALUES**  
Distributors pumps  
Engine model: 6D95L

BOSCH No. 9 460 610 439  
ZEXEL No. 104761-4013  
Date: 25.6.1990 [3]  
Company: KOMATSU  
No. 6206711171

Injection pump no. 104661-4012

(NP-VE6/11F1075RNP39)

Pump rot.: Clockw.-viewed from drive side  
Prestroke: - mm

Test-nozzle holder combination:  
1 688 901 000

Test pressure line:  
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel		(mm)		
1-2	Supply pump pressure	250	1.5 - 1.9 (kg/cm <sup>2</sup> )		
1-3	Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	750	45.1 - 46.1 (cc/1000st) (cc/1000st)		3.0
1-4	Idle speed regulation	350	10.2 - 14.2 (cc/1000st)		2.0
1-5	Start	100	60.0 - 90.0 (cc/1000st)		
1-6	Full-load speed regulation	1150	14.5 - 20.5 (cc/1000st)		4.5
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm mm			
2-2 Supply pump	N = rpm kg/cm <sup>2</sup>	250 1.5 - 1.9	750 2.6 - 3.6	
2-3 Overflow delivery	N = rpm cc/10s		750 30.0 - 73.3	
2-4 Fuel injection quantities				
Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	500	42.1 - 47.1		
	750	44.6 - 46.6		
	1075	35.6 - 40.6		
	1150	14.0 - 21.0		
	1200	below 3.0		
Switch off	100	below 18.0 (full)		
	500	0 (idle)		
Idle stop	200	37.3 - 47.3		
	250	28.3 - 38.3		
	350	10.2 - 14.2		
	450	below 3.0		
2-5 Solenoid	Cut-in voltage max.16 V Test voltage: 24 - 26 V			

3. Dimensions

K	2.7 - 2.9 mm
KF	4.9 - 5.1 mm
MS	0.8 - 1.0 mm
BCS	- mm
	- mm
Control lever angle	
$\alpha$	21.0 - 29.0 deg
A	2.5 - 7.7 mm
$\beta$	35.0 - 45.0 deg
B	10.1 - 14.1 mm
$\gamma$	deg
C	mm

**G24**

ZEXEL - Test values  
Injection pumps



**G25**

ZEXEL - Test values  
Injection pumps



ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 110 1/4  
ZEXEL No. : 106671-3282  
Date : 25.06.1990 [3]  
Company : HINO  
Engine : EK100 / 22000-2175A

IP-Type number : 106067-5491 / PE6P  
Governor type number : 105488-7480 EP/RFD-B

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm : 3.3 ± 0.06  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1-4-2-6-3-5  
  
Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-60-120-180-240-300  
  
Tolerance +- °C: 0.50 (0.75)

H1

ZEXEL - Test values  
Injection pumps



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.9	500	125.5 ± 3	± 4	Lever	
B	10.4	700	141.2 ± 2	± 2	Lever	Basic
C	10.9	1150	149.7 ± 3	± 4	Lever	
D	approx. 5.5	225	16 ± 3	± 15	Rack	
E	(11.4)	100	135 + 20	-	Lever	

Timing Advance Specification : EP/SP  
105635-0111

Speed (rpm)	950	1000	1050	1150			
Advance Angle (deg)	below 0.5	below 1.5	1.4-2.4	4.2-4.8			

**H2**

ZEXEL - Test values

Injection pumps



**H3**

ZEXEL - Test values

Injection pumps



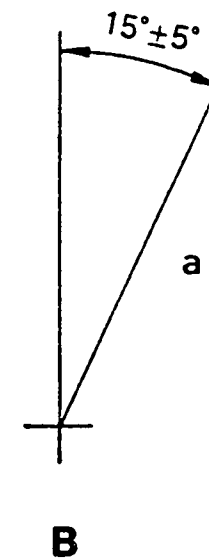
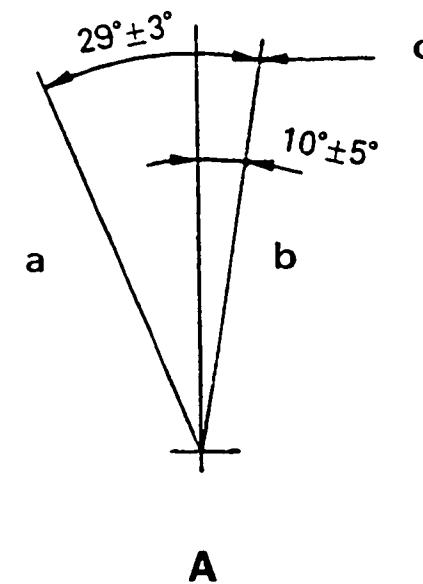
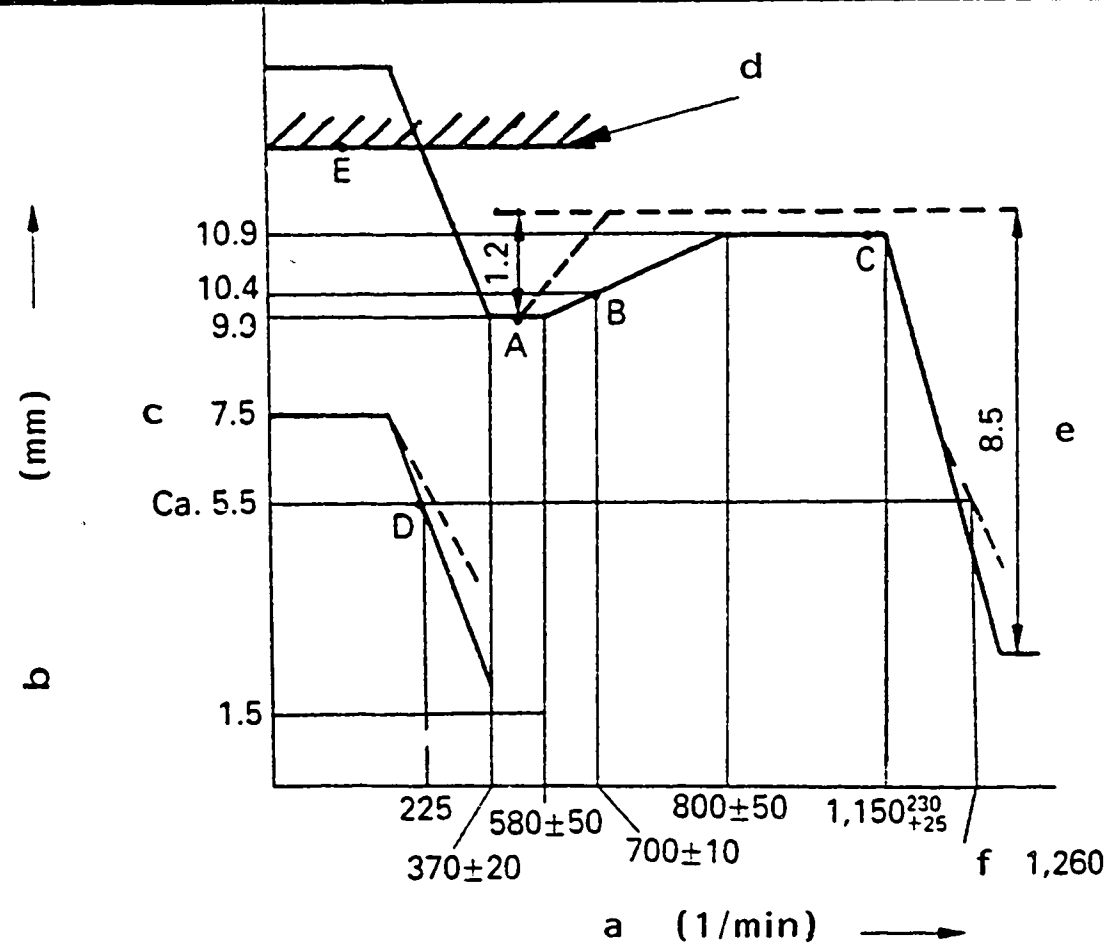


Fig.51

GOVERNOR ADJUSTMENT

- a = Pump speed
- b = Control rack position
- c = above
- d = Rack limit:  $11.4^{+0.2}$
- e = Damper spring setting:  $5 - 0.2$
- f = below

A = Load control lever angle

B = Speed control lever angle

- a = Full-load
- b = Idling
- c = Stopper bolt set

a = Full-speed

■ Note

Before adjustment, first remove the damper spring, the cover and the idling spring capsule.

	Speed (rpm)	Rack position (mm)	Remarks
Torque control stroke adjustment (temporarily)	approx. 800	11.1	<ul style="list-style-type: none"> <li>• Speed control lever and load control lever: temporary setting</li> <li>• Adjust using adjusting screw (2)</li> <li>• Confirm</li> </ul>
	approx. 500	9.9	
	approx. 600	11.1	
Flyweight lift and full-load position	700 - 800	10.9	<ul style="list-style-type: none"> <li>• Speed control lever temporary setting</li> <li>• Adjust using screw (3)</li> </ul>
	approx. 1300	approx. 2.4	
Decrease pump speed to 1150 rpm and adjust the high speed lift value (8.5 + 0.5) mm using screw (2).			
Idling adjustment	470	1.5	<ul style="list-style-type: none"> <li>• Adjust using screw (4)</li> <li>• Adjust using spring capsule (6)</li> <li>• Confirm</li> <li>• Confirm</li> <li>• Confirm the control lever angle is (10° ± 5°)</li> </ul>
	225	approx. 5.5	
	0	above 7.5	
	370 ± 20	1.5	
Damper spring setting	Maintain the pump speed at 225 rpm and set the control rod at the approx. 5.5 mm position using the control lever. Then, gradually increase the pump speed until the rod position is 5.9 - 0.2 mm. Tighten the damper spring capsule and fix it in the position where it begins to move the rod from the 5.9 - 0.1 mm position.		
Maximum speed starting point and speed droop check	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	1150 +30 +25 below 1260	10.9 approx. 5.5	<ul style="list-style-type: none"> <li>• Adjust using screw (4)</li> <li>• Confirm</li> <li>• Confirm the control lever angle (speed lever angle: 15° ± 5°; load lever angle: 29° ± 3°)</li> <li>• Confirm that there is no fuel injection</li> </ul>
	approx. 1300	-	
Torque control spring adjustment	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	700 ± 10	10.4	<ul style="list-style-type: none"> <li>• Adjust using torque control spring capsule (7)</li> <li>• Confirm</li> <li>• Confirm</li> </ul>
	580 ± 50	9.9	
800 ± 50	10.9		
Smoke limiter setting	Fix the load control lever in the full-load position		
	100 100	11.4 + 0.2 -	<ul style="list-style-type: none"> <li>• Adjust using rack limiter</li> <li>• Confirm injection quantity at point E.</li> </ul>

H6

ZEXEL - Test values  
Injection pumps



H7

ZEXEL - Test values  
Injection pumps



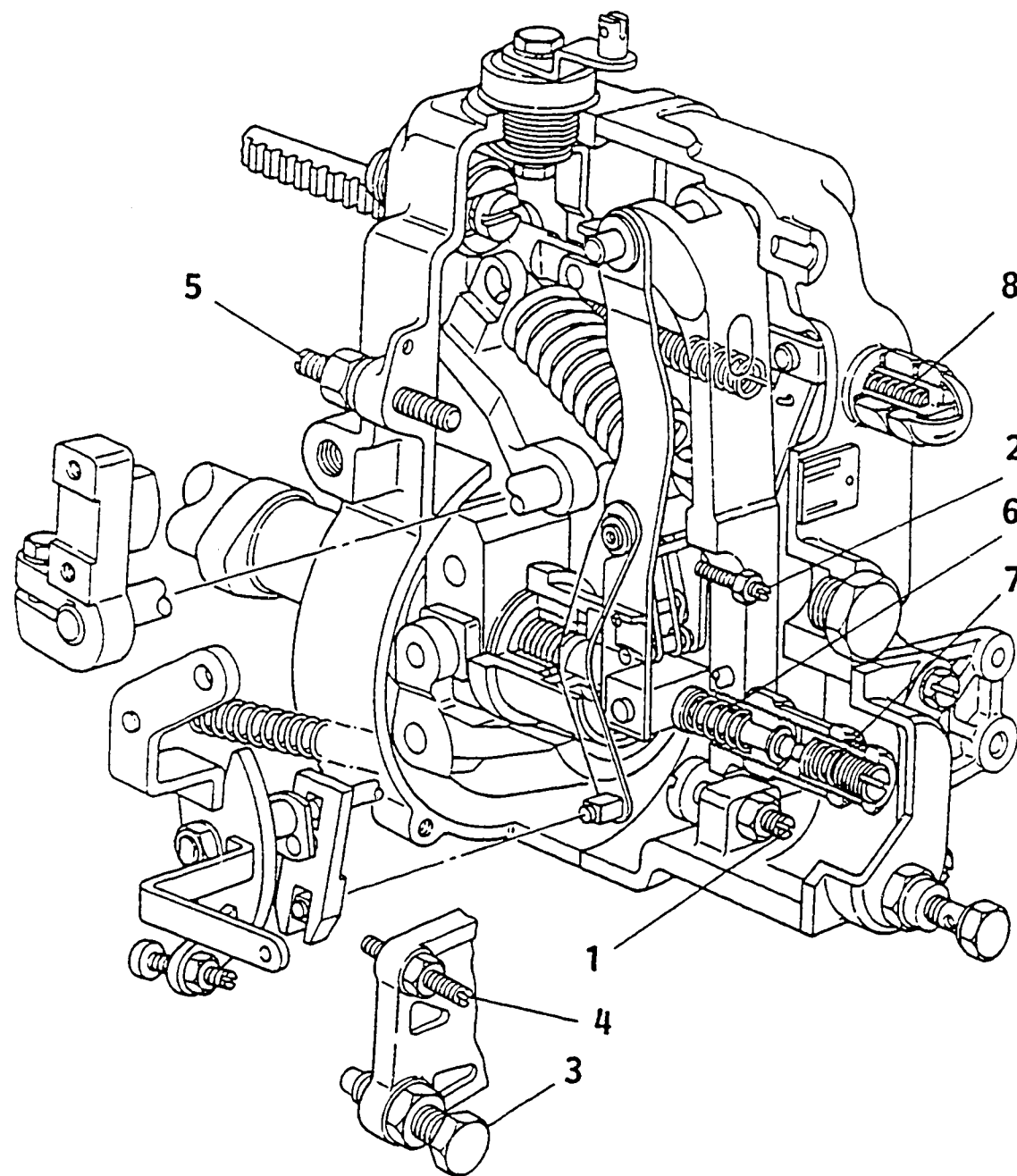


Fig. 52

106671-3282 4/4

- 1 = Screw
- 2 = Screw
- 3 = Screw
- 4 = Screw

- 5 = Screw
- 6 = Spring capsule
- 7 = Spring capsule
- 8 = Spring capsule

**H8**

ZEXEL - Test values  
Injection pumps



**H9**

ZEXEL - Test values  
Injection pumps





ZEXEL - TEST VALUES  
Injections pumps

BOSCH No. : 9 400 610 111 1/5  
ZEXEL No. : 106671-3484  
Date : 25.06.1990 [3]  
Company : HINO  
Engine : EK100 / 22000-3635A

IP-Type number : 106067-7510 / PE6P  
Governor type number : 105488-8600 EP/RFD-C

TEST PREREQUISITES

Test oil : ISO-4113  
Test oil inlet temperature °C : 40.00...45.00  
Inlet pressure bar : 1.6  
Test nozzle holder combination : 1 688 901 013  
Opening pressure bar : 175  
Test pressure line  
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.3 ± 0.01  
Rod position mm : -  
Port closing mark Cyl. No. : -  
Cam sequence : 1-4-2-6-3-5  
  
Port closing mark Cyl. No. : -  
Port closing difference °NW : 0-60-120-180-240-300  
  
Tolerance +- °C: 0.50 (0.75)

**H10**

ZEXEL - Test values  
Injection pumps



Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	( 9.9)	500	115.5 - 117.5	± 4	Lever	
B	(10.3)	700	125.7 - 129.7	± 2	Lever	
C	(10.6)	1150	131.7 - 137.7	± 4	Lever	
D	approx. 7.0	225	12.0 - 18.0	± 15	Rack	
E	-	100	119.3 - 133.7	-	Lever	

Timing Advance Specification : EP/SP  
105635-0041

Speed (rpm)	650-750	900	1150				
Advance Angle (deg)	Start 0	0.9-1.9	3.5-4.5				

H11

ZEXEL - Test values  
Injection pumps



H12

ZEXEL - Test values  
Injection pumps



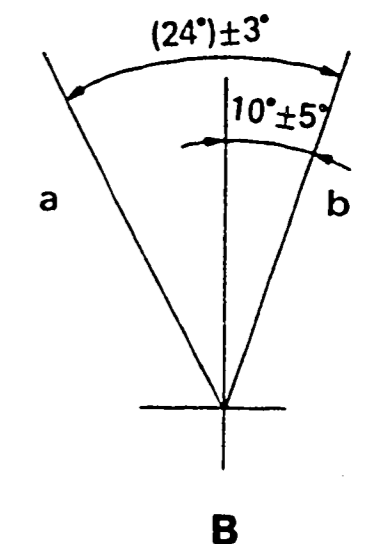
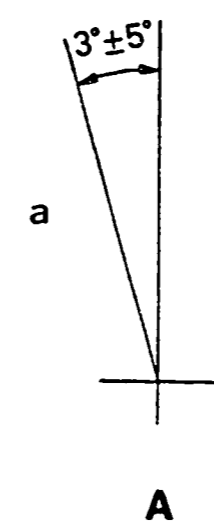
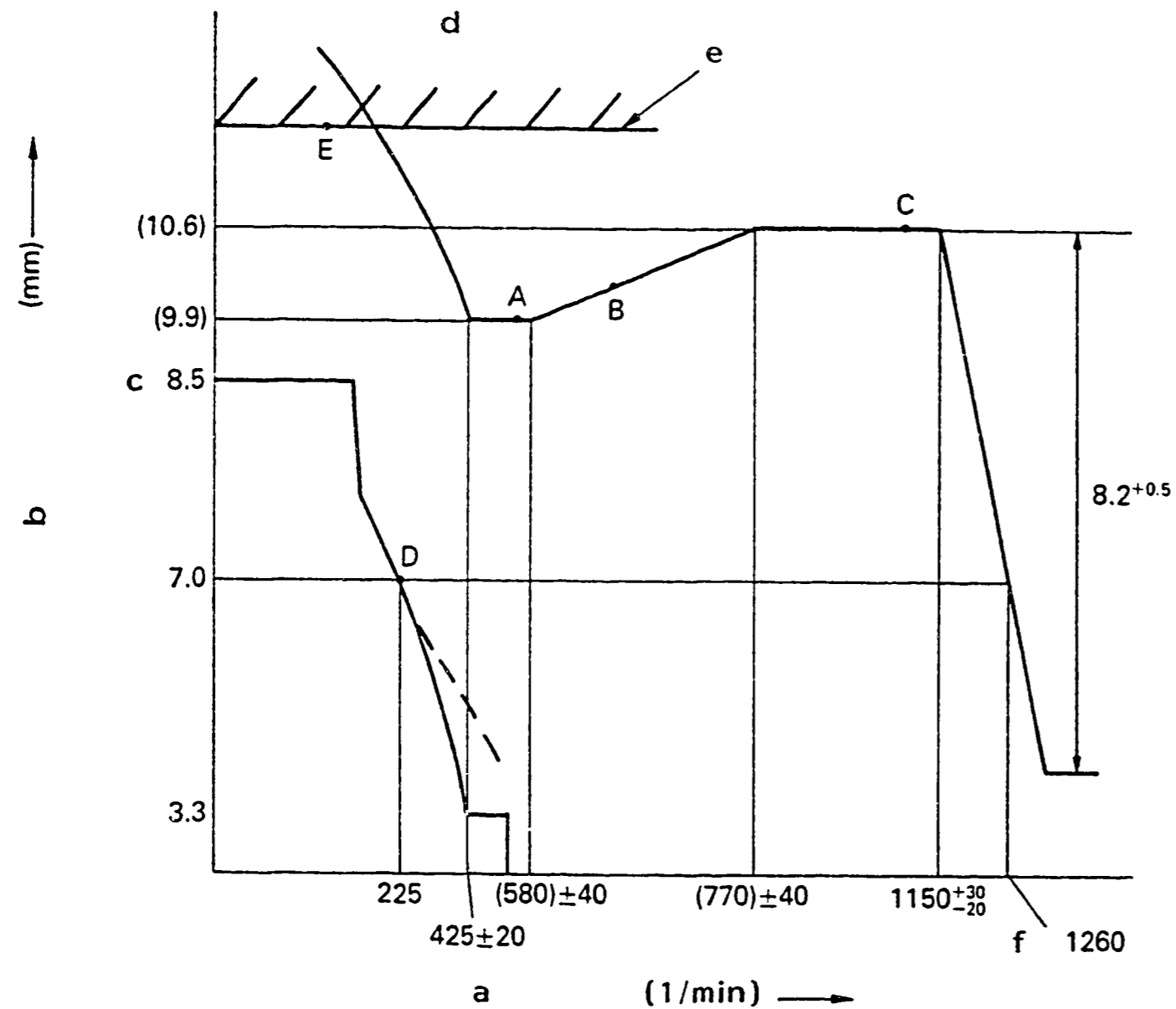


Fig.53

GOVERNOR ADJUSTMENT

106671-3484 2/5

- a = Pump speed
- b = Control rack position
- c = above
- d = Damper spring set: 6.2 - 0.2
- e = Rack limit
- f = below

A = Speed control lever angle

B = Stopper bolt set

a = Full-speed

a = Full-load

b = Idling

Note

Before adjustment, first remove the damper spring, the cover and the idling spring capsule.

H13

ZEXEL - Test values  
Injection pumps



H14

ZEXEL - Test values  
Injection pumps



	Speed (rpm)	Rack position (mm)	Remarks
Torque control stroke adjustment (temporarily)	approx. 800 approx. 500 approx. 700	(10.6) ( 9.9) (10.3)	<ul style="list-style-type: none"> <li>• Speed control lever and load control lever: temporary setting</li> <li>• Adjust using adjusting screw (6)</li> <li>• Confirm</li> </ul>
Flyweight lift and full-load position	1000 1170 - 1180 approx. 1300	(10.6) (10.6) approx. 2.4	<ul style="list-style-type: none"> <li>• Adjust using screw (1)</li> <li>• Adjust using screw (8)</li> <li>• Adjust using screw (3)</li> </ul>
	Decrease pump speed to 1150 <sup>+25+10</sup> rpm and adjust the high speed lift value (8.2 ± 0.5) mm using screw (3).		
Idling adjustment	525 225 0 425 ± 20	3.3 7.0 above 8.5 3.3	<ul style="list-style-type: none"> <li>• Adjust using screw (8)</li> <li>• Adjust using spring capsule (5)</li> <li>• Confirm</li> <li>• Confirm the control lever angle is (10° ± 5°)</li> </ul>
Damper spring setting	Maintain the pump speed at 225 rpm and set the control rod at the 7.0 mm position using the control lever. Then, gradually increase the pump speed until the rod position is 6.2 - 0.2 mm. Tighten the damper spring capsule and fix it in the position where it begins to move the rod from the 6.2 - 0.1 mm position.		
Maximum speed starting point and speed droop check	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	1150 <sup>+30+20</sup> below 1260  approx. 1300	(10.6) 7.0  -	<ul style="list-style-type: none"> <li>• Adjust using screw (2)</li> <li>• Confirm</li> <li>• Confirm the control lever angle (speed lever angle: 3° ± 5°; load lever angle: approx. 24°)</li> <li>• Confirm that there is no fuel injection</li> </ul>
Torque control spring adjustment	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	(700)  (580) ± 40 (770) ± 40	(10.3)  ( 9.9) (10.6)	<ul style="list-style-type: none"> <li>• Adjust using torque control spring capsule (5)</li> <li>• Confirm</li> <li>• Confirm</li> </ul>
Smoke limiter setting	Fix the load control lever in the full-load position		
	100	-	<ul style="list-style-type: none"> <li>• Adjust using rack limiter</li> <li>• Adjust injection quantity at point E, using rack limiter.</li> </ul>



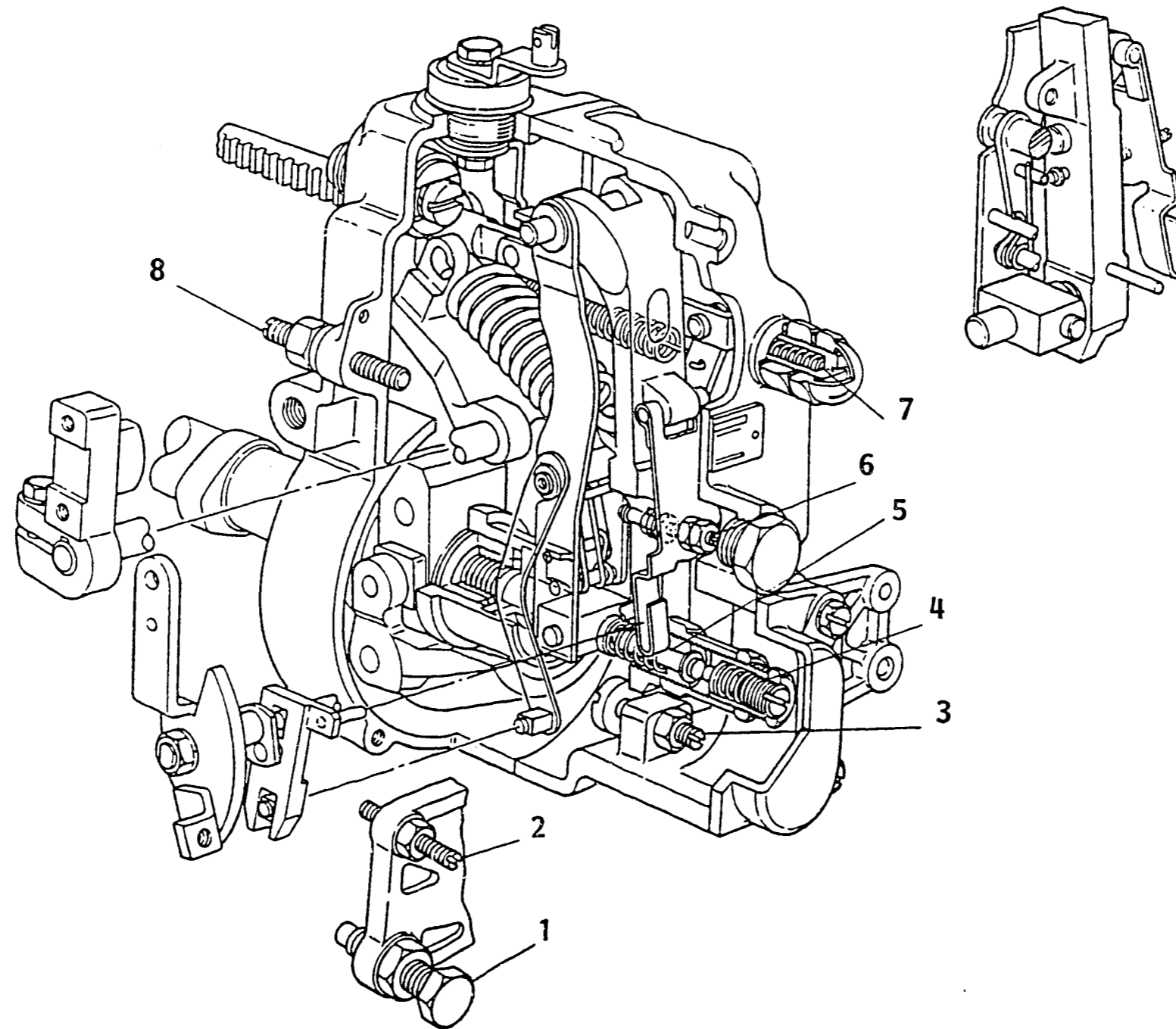


Fig. 54

- 1 = Screw
- 2 = Screw
- 3 = Screw
- 4 = Spring capsule

- 5 = Spring capsule
- 6 = Screw
- 7 = Spring capsule
- 8 = Screw

106671-3484 4/5

**H17**

ZEXEL - Test values  
Injection pumps



**H18**

ZEXEL - Test values  
Injection pumps



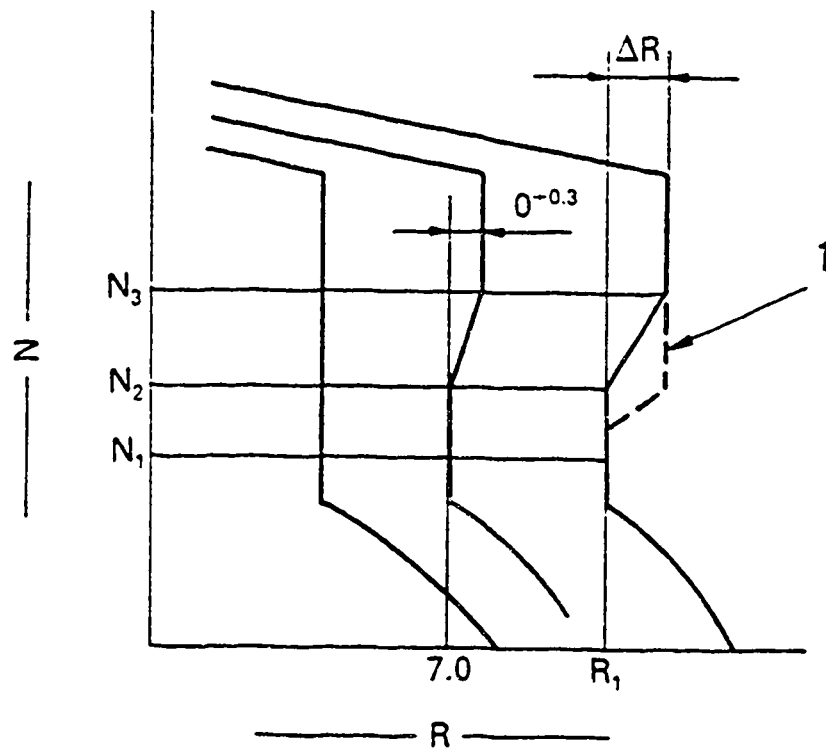


Fig. 55

106671-3484 5/5

1 = Torque control spring less

#### Negative torque control governor adjustment

The adjustment procedure is identical to that of current RFD + governors, although with RFD + governors the full-speed lever must be used when determining the positive torque control stroke.

1. Remove the torque control spring capsule.
2. Operate the pump at approx. 500 rpm ( $N_1$ ; the point at which the idling spring stops operating is  $< N_1$ ).



(Continued)

3. Move the full-speed lever towards the FULL position and set it at  $R_1$ .
4. Increase the pump speed by adjusting the screw, and ensure that the torque control stroke  $\Delta R$  can be obtained.

**Note:**

The screw is located in the bracket on the end of the tension lever, and is accessible through the adjustment opening.

5. Adjust  $N_2$  and  $N_3$  using the torque control spring capsule.

**H20**

ZEXEL - Test values

Injection pumps

